

South Mayo River, North Fork Mayo River, South Fork Mayo River, Blackberry Creek, Marrowbone Creek, Leatherwood Creek, and Smith River Watershed Implementation Plan

Technical Report



Submitted To: Virginia Department of Conservation
and Recreation

Prepared By: Blue Ridge Environmental Solutions, Inc.

Submitted: May 2013

TABLE OF CONTENTS

TABLES	1
FIGURES.....	3
ACKNOWLEDGEMENTS	4
EXECUTIVE SUMMARY	5
Introduction.....	5
Review of TMDL Study.....	6
Public Participation.....	6
Implementation Actions	7
Measurable Goals and Milestones for Attaining Water Quality Standards	8
Stakeholder’s Roles and Responsibilities	9
Integration with Other Watershed Plans	10
Potential Funding Sources	11
INTRODUCTION	13
Background.....	13
Project Methodology	13
STATE AND FEDERAL REQUIREMENTS FOR IMPLEMENTATION PLANS.....	15
Designated Uses	16
REVIEW OF TMDL DEVELOPMENT STUDY.....	17
Watershed Description.....	17
Water Quality Assessment	18
Bacteria Sources	21
Modeling Procedures	22
TMDL Allocation and Staged Implementation Reductions.....	22
Implications of TMDL and Modeling Procedure on Implementation Plan Development	24
PUBLIC PARTICIPATION	25
Process.....	25
Agricultural Working Group Summary	26
Residential/Urban Working Group Summary.....	27
Governmental Working Group Summary.....	29

Steering Committee Summary	31
IMPLEMENTATION ACTIONS	32
Identification of Control Measures.....	32
Quantification of Control Measures	35
Agricultural Implementation Needs.....	35
Residential Implementation Needs.....	44
Other Potential Implementation Needs.....	44
Assessment of Technical Assistance Needs.....	47
Cost Analysis	48
Benefit Analysis	52
Human Health	52
Livestock Herd Health	52
Economics	52
Aquatic Community Improved	53
MEASUREABLE GOALS AND MILESTONES FOR ATTAINING WATER QUALITY STANDARDS	54
Targeting.....	60
Water Quality Monitoring	68
STAKEHOLDER’S ROLES AND RESPONSIBILITIES.....	71
BRSWCD and PSWCD.....	75
Patrick and Henry Counties & City of Martinsville Government Departments	75
Citizens & Businesses	75
Community Civic Groups.....	75
Animal Clubs/Associations	75
Dan River Basin Association	75
West Piedmont Planning District Commission.....	75
VADEQ	75
VADCR	76
VDH.....	76
VADACS:	76
VDGIF.....	77

VADOF	77
VCE	77
VOF	77
USEPA	77
NRCS	77
INTEGRATION WITH OTHER WATERSHED PLANS.....	78
POTENTIAL FUNDING SOURCES	79
Federal Funding Sources.....	79
Virginia Funding Sources	82
Regional Funding Sources.....	84
LIST OF ACRONYMS.....	87
GLOSSARY	89
APPENDIX A.....	92
Agricultural & Residential/Urban Working Groups October 16, 2012 Meeting Summary.....	93
Agricultural & Residential/Urban Working Groups January 29 & 30 2013 Meeting Summary	98
APPENDIX B	106
Governmental Working Group December 12, 2012 Meeting Summary	107
APPENDIX C	113
Steering Committee March 13, 2013 Meeting Summary	114
APPENDIX D.....	118
October 16, 2013 Public Meeting Summary	119
March 28, 2013 Public Meeting Summary.....	123

TABLES

Table 1. Watershed area and land use distribution.....	17
Table 2. Sources of bacteria in the impaired watersheds.....	21
Table 3. TMDL load reductions specified during TMDL development.....	23
Table 4. Staged implementation load reductions specified during TMDL development.	23
Table 5. Meetings held during the TMDL IP development process.	26
Table 6. Control measures with average unit cost and reduction efficiency identified to meet implementation goals for bacteria reductions.....	34
Table 7. Perennial stream length, existing fencing installed, and estimated exclusion fencing length needed in the impairments.....	39
Table 8. Average streamside fencing and division of incentive programs used to estimate livestock exclusion system quantity and cost.	40
Table 9. Estimation of control measures needed to meet pasture and cropland bacteria load reduction Stage I (years 1-12) implementation goals.....	42
Table 10. Estimation of control measures needed to meet pasture and cropland bacteria load reduction Stage II (years 13-15) implementation goals.	43
Table 11. Estimation of control measures needed to meet residential/urban and onsite sewage disposal systems bacteria load reduction Stage I (years 1-12) implementation goals.....	45
Table 12. Estimation of control measures needed to meet residential/urban and onsite sewage disposal systems bacteria load reduction Stage II (years 13-15) implementation goals.....	46
Table 13. Implementation cost for control measures installed addressing livestock access, pasture, and cropland bacteria load reductions in all impairments.	50
Table 14. Implementation cost for control measures installed addressing on-site sewage disposal systems, pets, and stormwater bacteria load reductions in all impairments.	51
Table 15. Targeted implementation stages for control measures installation.....	56
Table 16. Cumulative implementation of control measures and water quality milestones.	57
Table 17. Implementation cost associated with percentage of practices installed along with technical assistance addressing agricultural and residential needs in the watersheds.....	59
Table 18. Subwatershed priority ranking for livestock exclusion fencing installation.	62

Table 19. Subwatershed priority ranking for correcting failing septic systems and replacing straight pipes.	66
Table 20. Monitoring <i>station</i> identification, station location, and station type for VADEQ monitoring stations in the watershed.	69
Table 21. Governmental implementation action items.....	72
Table 22. Agricultural implementation action items.	73
Table 23. Residential/urban implementation action items.	74
Table 24. Control measures with estimated cost-share program and landowner costs.....	86

FIGURES

Figure 1. Watersheds location.	19
Figure 2. Land uses in the watersheds.....	20
Figure 3. Potential livestock exclusion fencing analysis results for portion of South Fork Mayo River.	36
Figure 4. Potential livestock exclusion fencing analysis results for the South Fork Mayo River watersheds.....	37
Figure 5. Potential livestock exclusion fencing analysis results for the Smith River watersheds.....	38
Figure 6. Subwatershed division for impaired watersheds.	61
Figure 7. Failed septic system estimates per subwatershed.	64
Figure 8. Straight pipe estimates per subwatershed.....	65
Figure 9. Location of VADEQ monitoring stations in the watersheds.	70

ACKNOWLEDGEMENTS

Debra Parsons Buchanan, Henry County Board of Supervisors

Dale Wagoner, Henry County

Andy Lash, City of Martinsville

Michael Ward, Henry County Public Service Authority

Perry W. Morgan, Blue Ridge Soil and Water Conservation District

Kathy B. Smith, Blue Ridge Soil and Water Conservation District

Jack M. Hodges, Blue Ridge Soil and Water Conservation District

Michael Tabor, Blue Ridge Soil and Water Conservation District

Tony Collins, Patrick Soil and Water Conservation District

Aaron Burdick, West Piedmont Planning District Commission

Joseph Bonanno, West Piedmont Planning District Commission

Wayne Kirkpatrick, Dan River Basin Association

Brian Williams, Dan River Basin Association

Anna Wallace, Dan River Basin Association

Heather Vereb, Virginia Department of Conservation and Recreation

Charles Lunsford, Virginia Department of Conservation and Recreation

Mary Dail, Virginia Department of Environmental Quality

Darrin Doss, Virginia Department of Health

Jeff Turner, Virginia Department of Health

Josh Dodson, Natural Resources Conservation Service

Jack O'Connell, Natural Resources Conservation Service

Steering Committee Members

Agricultural Working Group Members

Residential/Urban Working Group Members

Governmental Working Group Members

EXECUTIVE SUMMARY

Introduction

The Virginia Total Maximum Daily Load (TMDL) program is a process to improve water quality and restore impaired waters in Virginia. Specifically, TMDL is the maximum amount of pollutant that a waterbody can assimilate without surpassing the state water quality standards for protection of the six beneficial uses: drinking water, recreational (i.e., primary contact/swimming), fishing, shellfishing, aquatic life, and wildlife. If the water body surpasses the water quality standard during an assessment period, Section 303(d) of the Clean Water Act and the United States Environmental Protection Agency's Water Quality Management and Planning Regulation (40 CFR Part 130) both require states to develop a TMDL for each pollutant.

South Mayo River was initially placed on the Virginia Water Quality Assessment 305(b)/303(d) Integrated Report in 1998 for exceedances of the bacteria standard. Blackberry Creek, Marrowbone Creek, Leatherwood Creek, and Smith River were initially placed on the list in 2002 and in 2004 North Fork Mayo River and South Fork Mayo River were added. After these listings, a TMDL study was conducted to identify bacteria sources in the watersheds. After a TMDL study is complete and approved by the United States Environmental Protection Agency, Virginia's 1997 Water Quality Monitoring, Information and Restoration Act states in section 62.1-44.19:7 that the "Board shall develop and implement a plan to achieve fully supporting status for impaired waters". To comply with this state requirement, a TMDL implementation plan was developed to reduce bacteria levels to attain water quality standards allowing delisting of streams from the Virginia Water Quality Assessment 305(b)/303(d) Integrated Report. The TMDL implementation plan describes control measures, which can include the use of better treatment technology and the installation of best management practices, to be implemented in a staged process.

Local support and successful completion of the implementation plan will enable restoration of the impaired water while enhancing the value of this important resource for the Commonwealth. Opportunities for Patrick and Henry Counties; City of Martinsville; local agencies; and watershed residents to obtain funding will improve with an approved implementation plan.

Key components of the implementation plan are discussed in the following sections:

- [Review of TMDL Development Study](#)
- [Public Participation](#)
- [Implementation Actions](#)
- [Measurable Goals and Milestones for Attaining Water Quality Standards](#)
- [Stakeholder's Roles and Responsibilities](#)
- [Integration with Other Watershed Plans](#)
- [Potential Funding Sources](#)

Review of TMDL Study

Impairment description, water quality monitoring, watershed description, source assessment, water quality modeling, and allocated reductions were reviewed to determine implications of TMDL and modeling procedures on implementation plan development. Conditions outlined in the TMDL development study to address the bacteria impairments in these watersheds include:

- Exclusion of most/all livestock including horses from streams is necessary;
- Substantial land-based nonpoint source pollution load reductions are called for on pasture and cropland;
- All straight pipes and failing septic systems need to be identified and corrected;
- Implicit in the requirement to correct straight pipes and failing septic systems is the requirement to maintain all properly functioning septic systems;
- Reductions to pet bacteria loads on residential land use are necessary;
- Installation of riparian buffers and retention ponds/basins were recommended in the South Mayo River TMDL to achieve land-based residential NPS load reductions; and
- Implicit in the requirement for no point source bacteria load adjustment is the requirement for point sources to maintain permit compliance.

Public Participation

The actions and commitments compiled in this document are formulated through input from citizens of the watershed; Patrick County government; Henry County government; City of Martinsville government; Henry County Public Service Authority; Patrick Soil and Water Conservation District; Blue Ridge Soil and Water Conservation District; West Piedmont Planning District Commission; Piedmont Triad Regional Council; Patrick County Farm Bureau; Dan River Basin Association; Virginia Department of Conservation and Recreation; Virginia Department of Environmental Quality; Virginia Department of Health; Virginia Department of Forestry; Virginia Cooperative Extension; Natural Resources Conservation Service; United States Army Corps of Engineers; and Blue Ridge Environmental Solutions, Inc.

Public participation took place during implementation plan development on three levels. First, public meetings were held to provide an opportunity for informing the public as to the end goals and status of the project, as well as a forum for soliciting participation in the smaller, more-targeted meetings (*i.e.*, working groups and Steering Committee). Second, three working groups were formed: Agricultural, Residential/Urban, and Governmental. Third, a Steering Committee was formed with representation from the Agricultural, Residential/Urban, and Governmental Working Groups; Patrick and Henry Counties government; City of Martinsville government; Patrick Soil and Water Conservation District; Blue Ridge Soil and Water Conservation District; West Piedmont Planning District Commission; Virginia Department of Conservation and Recreation; Virginia Department of Environmental Quality; Virginia Department of Health; Virginia Department of Forestry; Natural Resources Conservation Service; and Blue Ridge Environmental Solutions, Inc. to guide the development of the implementation plan. Over 200 man-hours were devoted to attending these meetings by individuals representing agricultural, residential, urban, commercial, environmental, and government interests on a local, state, and federal

level. Throughout the public participation process, major emphasis was placed on discussing best management practices (BMPs), locations of control measures, education, technical assistance, monitoring, and funding.

Implementation Actions

The actions and cost needed in both implementation stages were identified and quantified. The overall numbers presented represent the Stage II goal of TMDL source allocation attainment (*i.e.*, no water quality standard exceedance). An assessment was also conducted to quantify actions and cost to meet source allocations that translate to an instantaneous standard violation rate of 10.5% or less resulting in removal of these streams from the Commonwealth of Virginia's Section 303(d) List of Impaired Waters. This is referred to as the Stage I implementation goal.

The quantity of control measures, or BMPs, required during implementation was determined through spatial analyses of land use, stream-network, and the Commonwealth of Virginia aerial maps along with regionally appropriate data archived in the Virginia Department of Conservation and Recreation Agricultural BMP Database and TMDL document. Bacteria load reductions on land uses were determined through modeling alternative implementation scenarios, defining percentage of land use area or unit amount treated by control measure, then applying related reduction efficiency to the associated load. Additionally, input from local agency representatives, citizens, and contractors were used to verify the analyses. Estimates of control practices needed for full implementation in these watersheds are:

- ★ 113 Livestock Exclusion Systems (CREP)
- ★ 308 Livestock Exclusion Systems (EQIP)
- ★ 632 Livestock Exclusion Systems (LE-1T)
- ★ 16 Small Acreage Grazing Systems (SL-6AT)
- ★ 244 Livestock Exclusion Systems (LE-2T)
- ★ 22 Stream Protection Systems (WP-2T)
- ★ 56 CREP Watering System Extension (SL-7T)
- ★ 71,637 acres of Improved Pasture Management
- ★ 31,505 acres of pasture treated by Retention Ponds
- ★ 28 acres of Permanent Vegetative Cover on Cropland (SL-1)
- ★ 56 acres of Reforestation of Erodible Crop and Pastureland (FR-1)
- ★ 1,625 acres of cropland with Manure/Litter/Biosolids Incorporation into Soil
- ★ Two Dry Manure Storage Facilities
- ★ 754 Septic Tank Pump-outs
- ★ 69 Connections to Public Sewer
- ★ 351 Septic System Repairs
- ★ 269 New Conventional Septic Systems
- ★ 36 New Conventional Septic Systems with Pump
- ★ 29 Alternative On-site Sewage Disposal Systems
- ★ Two Pet Waste Education Program
- ★ 565 Pet Waste Enzyme Digesting Composters

- ★ Five Confined Canine Unit Waste Treatment Systems
- ★ 66 acres of residential landuse treated with Vegetated Buffers
- ★ 322 acres of residential landuse treated with Bioretention
- ★ 18 acres of residential landuse treated with Infiltration Trenches
- ★ One Agricultural Technical Assistance Full Time Equivalent per year
- ★ One Residential Technical Assistance Full Time Equivalent per year

Associated cost estimations for each implementation action were calculated by multiplying the average unit cost per the number of units. Focusing on Stage I (*i.e.*, removal of impaired stream segments from impaired waters list) costs, the total agricultural corrective action costs equal \$36.3 million. Estimated corrective action costs needed to replace straight pipes and fix failing septic systems during Stage I totals \$3.8 million. The cost to implement the pet waste reduction strategies totals an estimated \$0.1 million. Cost to install vegetated buffers, rain gardens, and infiltration trenches during Stage I equal \$2.0 million. The total costs to provide assistance in the agricultural and residential programs during Stage I implementation are expected to both equal to \$0.6 million. The total Stage I implementation cost including technical assistance is \$43.4 million with the agricultural cost being \$36.9 million and residential cost \$6.5 million. The total Stage II implementation cost including technical assistance is \$9.2 million with the agricultural cost being \$6.0 million and residential cost \$3.2 million.

The primary benefit of implementation is cleaner waters in Virginia, where bacteria levels in the South Mayo River, North Fork Mayo River, South Fork Mayo River, Blackberry Creek, Marrowbone Creek, Leatherwood Creek, and Smith River impairments will be reduced to meet water quality standards, benefiting human and livestock herd health, local economies, and aquatic ecosystems. It is hard to gauge the impact that reducing fecal contamination will have on public health, as most cases of waterborne infection are not reported or are falsely attributed to other sources. However, the incidence of infection from fecal sources, through contact with surface waters, should be reduced considerably. An important objective of the implementation plan is to foster continued economic vitality and strength by increasing tourism and recreational opportunities. Healthy waters can improve economic opportunities for Virginians, and a healthy economic base can provide the resources and funding necessary to pursue restoration and enhancement activities. The control measures recommended in this document will provide economic benefits to the landowner, along with the expected environmental benefits on-site and downstream. Improved aesthetics in public areas (*e.g.*, parks) and surrounding businesses provided by control measures (*e.g.*, pet waste kiosks and bioretention) has the potential to draw local citizens and visitors to these areas. A healthy waterway is vital to the public's recreational enjoyment of the area. Additionally, money spent on materials and technical assistance resources by landowners, government agencies, and non-profit organizations in the process of implementing the implementation plan will stimulate the local economy.

Measurable Goals and Milestones for Attaining Water Quality Standards

The end goals of implementation are restored water quality in the impaired waters and subsequent de-listing of streams from the Virginia Water Quality Assessment 305(b)/303(d) Integrated Report. Progress toward end goals will be assessed during implementation through tracking of control measure

installations. The Virginia Department of Environmental Quality will continue to assess water quality through its monitoring program. Implementation will be assessed based on reducing exceedances of the bacteria water quality standard, thereby improving water quality. Implementation of control measures is scheduled for 15 years and will be assessed in two stages. Stage I is based on meeting source allocations that translate to an instantaneous standard exceedance rate of 10.5% or less resulting in de-listing of streams. The Stage II goal is based on implementing source allocations to meet the specified TMDL goal, 0% exceedance of water quality standards. Implementation of control measures is scheduled to begin in July 2013 lasting to June 2028. After implementation inception, five milestones will be met in three-year increments until streams are removed from the Virginia Water Quality Assessment 305(b)/303(d) Integrated Report.

Implementation in years one through 12 for agricultural source reductions focuses on installing livestock stream exclusion systems, improving pasture management, and cropland conversion to permanent vegetative cover or forest. BMPs installed in years 13 through 15 are based on additional treatment of bacteria load not treated during Stage I from pasture and cropland using improved pasture management, cropland conversion, manure incorporation into soil, and retention ponds.

Implementation in years one through 12 for residential bacteria loads focuses on performing septic tank pump-outs, identification and removal of straight pipes, repairing or replacing failed septic systems, instituting pet waste control education program, installation of pet waste enzyme digesting composters, installation of confined canine unit waste treatment systems, and vegetated buffer installation. Rain garden and infiltration trench installations will be concentrated in years 13 through 15 if needed.

Water quality improvement is expected to increase each year, 36% overall bacteria load reduction is expected at the third year, 48% in the sixth year, 60% in the ninth year, and 73% in the twelfth year. Based on water quality modeling projections, the impairments would be in a probable position to be de-listed from the List of Impaired Waters at the fourth milestone. Considering the dynamics of a stream ecosystem and the inherent difficulties that may arise preventing implementation, the final milestone of TMDL allocation attainment was set at 15 years following implementation commencement.

The process of a staged implementation implies targeting of control measures, ensuring optimum utilization of resources. In quantifying agricultural BMPs through the use of aerial photography, land use, and stream network GIS layers, maps were formulated showing potential livestock stream access, pastures, and crop fields. These maps identify farm tracts that Blue Ridge Soil and Water Conservation District and Patrick Soil and Water Conservation District should concentrate their efforts in. The district will coordinate with landowners and track BMP installation progress. Known problem areas, clusters of older homes, or houses in close proximity to streams known by the Virginia Department of Health will be targeted for on-site sewage disposal system control measures. Steps outlined in pet waste management stages results in targeting of source type and resources. Significant exposure to a rain garden and/or infiltration trench project would be attained if installed at schools, county administration buildings, or shopping centers in watershed.

Stakeholder's Roles and Responsibilities

Stakeholders are individuals who live or have land management responsibilities in the watershed, including private individuals, businesses, government agencies, and special interest groups. Successful

implementation depends on stakeholders taking responsibility for their role in the process, and the primary role falls on the local groups that are most affected; that is, citizens, businesses, and community watershed groups. However, local, state, and federal agencies also have a stake in seeing that Virginia's waters are clean and provide a healthy environment for its citizens. Stakeholder participation and support is essential for achieving the goals of this TMDL effort (*i.e.*, improving water quality and removing streams from the impaired waters list). It must first be acknowledged that there is a water quality problem, and changes must be made as needed in operations, programs, and legislation to address these pollutants. In the Commonwealth of Virginia, water quality problems are dealt with through legislation, incentive programs, education, and legal actions.

The Blue Ridge and Patrick Soil and Water Conservation Districts will provide cost-share funds, lead education and technical assistance efforts, and track best management practice implementation for the agricultural and residential programs. The West Piedmont Planning District Commission will coordinate cost-share fund distribution with the districts, lead education and outreach efforts, and report best management practice implementation for the residential program. The Dan River Basin Association will assist in developing volunteer monitoring programs and lead education and outreach efforts. State agencies conducting regulatory, education, or funding procedures related to water quality in Virginia include: Virginia Department of Environmental Quality; Virginia Department of Conservation and Recreation; Virginia Department of Health; Virginia Department of Agriculture and Consumer Services; Virginia Department of Game and Inland Fisheries; Virginia Department of Forestry; Virginia Cooperative Extension; and Virginia Outdoors Foundation. The Natural Resources Conservation Service will provide cost-share funds and technical assistance.

Integration with Other Watershed Plans

Each watershed within the state is under the jurisdiction of a multitude of individual yet related water quality programs and activities, many of which have specific geographical boundaries and goals. These include but are not limited to Watershed Implementation Plans, TMDLs, Roundtables, Water Quality Management Plans, Erosion and Sediment Control Regulations, Stormwater Management Program, Source Water Assessment Program, and local comprehensive plans. The progress of these planning efforts needs continuous evaluation to determine possible effects on implementation goals.

Coordination of local programs can increase participation in implementation activities and prevent redundancy. Several planned initiatives will coincide with TMDL implementation in this watershed

- Updates to Patrick and Henry Counties Comprehensive Plans
- Update to City of Martinsville Comprehensive Plan
- Martinsville-Henry County Rivers and Trails Recreational Use Plan
- Henry County PSA Philpott Reservoir Source Water Protection Plan
- Dan River Basin Association Eden Watershed Assessment – an IP-like study on a small watershed in the North Carolina portion of the Smith River watershed
- VADCR Mayo River State Park Endangered Species Study
- Trout Unlimited Strategic Plan

The implementation actions proposed in this plan will enhance these community improvement initiatives by improving water quality and making the rivers more attractive to visitors for tourism and recreational activities. Combined, these efforts can contribute to improvements in the area economy and residents' quality of life.

Potential Funding Sources

Potential funding sources available during implementation were identified in the course of plan development. An approved Watershed Implementation Plan makes these watersheds eligible for competitively awarded TMDL Implementation grants currently awarded through Virginia Department of Conservation and Recreation. The Virginia Department of Conservation and Recreation has provided Patrick Soil and Water Conservation District with Livestock Exclusion Initiative funds to promote livestock exclusion practices in the implementation plan area between July 2012 and June 2014. Detailed description of each funding source (*i.e.*, eligibility requirements, specifications, incentive payments) can be obtained from the Blue Ridge Soil and Water Conservation District; Patrick Soil and Water Conservation District; Virginia Department of Conservation and Recreation; Virginia Department of Health; Virginia Department of Environmental Quality; Virginia Department of Game and Inland Fisheries; Virginia Department of Forestry; Virginia Cooperative Extension; Virginia Outdoors Foundation; Natural Resources Conservation Service; and West Piedmont Planning District Commission. Potential funding sources include:

- Federal Clean Water Act Section 319 Incremental Funds
- U.S. Department of Agriculture (USDA) Conservation Reserve Enhancement Program (CREP)
- USDA Conservation Reserve Program (CRP)
- USDA Environmental Quality Incentives Program (EQIP)
- USDA Wetland Reserve Program (WRP)
- USDA Wildlife Habitat Incentive Program (WHIP)
- U.S. Fish and Wildlife Service Conservation Grants
- U.S. Fish and Wildlife Service Private Stewardship Program
- Virginia Agricultural Best Management Practices Cost-Share Program
- Virginia Agricultural Best Management Practices Tax Credit Program
- Virginia Water Quality Improvement Fund
- Virginia Forest Stewardship Program
- Virginia Small Business Environmental Compliance Assistance Fund
- Virginia Clean Water Revolving Loan Fund (VCWRLF)
- Virginia Outdoors Foundation
- Community Development Block Grant Program

- Southeast Rural Community Assistance Project (Southeast RCAP)
- National Fish and Wildlife Foundation
- STEP, Inc. (Support to Eliminate Poverty)
- Pittsylvania County Community Action Agency, Inc.
- Dan River Basin Association
- Trout Unlimited

INTRODUCTION

Background

The Virginia Total Maximum Daily Load (TMDL) program is a process to improve water quality and restore impaired waters in Virginia. Specifically, TMDL is the maximum amount of pollutant that a water body can assimilate without surpassing the state water quality standards for protection of the six beneficial uses: drinking water, recreational (i.e., primary contact/swimming), fishing, shellfishing, aquatic life, and wildlife. If the water body surpasses the water quality criteria during an assessment period, Section 303(d) of the Clean Water Act (CWA) and the United States Environmental Protection Agency's (USEPA) Water Quality Management and Planning Regulation (40 CFR Part 130) both require states to develop a TMDL for each pollutant.

South Mayo River was initially placed on the Virginia Water Quality Assessment 305(b)/303(d) Integrated Report in 1998 for exceedances of the bacteria standard. Blackberry Creek, Marrowbone Creek, Leatherwood Creek, and Smith River were initially placed on the list in 2002 and in 2004 North Fork Mayo River and South Fork Mayo River were added. After these listings, a TMDL study was conducted for South Mayo River in 2004 and remaining impairments in 2008 as part of the Dan River Watershed TMDL to identify bacteria sources in the watersheds and set limits on the amount of bacteria these waterbodies can tolerate and still maintain support of the Recreational Use.

A TMDL Implementation Plan (IP) was developed to describe and quantify implementation efforts that would reduce bacteria levels to attain water quality standards allowing delisting of the impaired waters from the Section 303(d) List. The TMDL IP describes control measures, which can include the use of better treatment technology and the installation of best management practices (BMPs), to be implemented in a staged process. Local support and successful completion of the implementation plan will enable restoration of the impaired water while enhancing the value of this important resource. Opportunities for Patrick and Henry Counties, City of Martinsville, local agencies, and watershed residents to obtain funding will improve with an approved IP.

Project Methodology

The overall goal of this project was to begin the process of restoring water quality in the South Mayo River, North Fork Mayo River, South Fork Mayo River, Blackberry Creek, Marrowbone Creek, Leatherwood Creek, and Smith River watersheds. Specific objectives in meeting this goal were:

1. Development of a staged IP for the watersheds;
2. Coordination of public participation; and
3. Implementation of control measures.

Key components of the implementation plan are discussed in the following sections:

- [Review of TMDL Development Study](#)
- [Public Participation](#)
- [Implementation Actions](#)
- [Measurable Goals and Milestones for Attaining Water Quality Standards](#)
- [Stakeholder's Roles and Responsibilities](#)

- **Integration with Other Watershed Plans**
- **Potential Funding Sources**

Public participation was an integral part in developing the IP and is critical to promote reasonable assurance that the implementation actions will occur. Public participation took place during IP development on three levels. First, public meetings were held to inform the public of project end goals and status of the project, as well as, a forum for soliciting participation in the smaller, more-targeted meetings (i.e., working groups and Steering Committee). Second, working groups were assembled from communities of people with common interests and concerns regarding implementation process and were the primary arena for seeking public input. Agricultural, Residential/Urban, and Governmental working groups were formed. A representative from Virginia Department of Conservation and Recreation (VADCR) or Blue Ridge Environmental Solutions, Inc. (BRES) coordinated each working group in order to facilitate the process and integrate information collected from the various communities. Third, a Steering Committee was formed with representation from the Agricultural, Residential/Urban, and Governmental Working Groups; Patrick and Henry Counties government; City of Martinsville government; Patrick Soil and Water Conservation District (PSWCD); Blue Ridge Soil and Water Conservation District (BRSWCD); West Piedmont Planning District Commission (WPPDC); VADCR; Virginia Department of Environmental Quality (VADEQ); Virginia Department of Health (VDH); Virginia Department of Forestry (VADOF); Natural Resources Conservation Service (NRCS); and BRES to guide the development of the implementation plan. Potential control measures, their associated costs and efficiencies, and potential funding sources were identified through review of the TMDL, input from working groups and Steering Committee, literature review, and discussion with BRSWCD, PSWCD, NRCS, and VDH. Implementation actions that can be promoted through existing programs were identified, as well as actions not currently supported by existing programs and their potential funding sources. Control measures were assessed based on cost, availability of existing funds, reasonable assurance of implementation, and water quality impacts.

The quantity of control measures, or BMPs, recommended during implementation was determined through spatial analyses and modeling alternative implementation scenarios. Spatial analyses of land use, stream-network, farm tracts, and the Commonwealth of Virginia aerial maps along with regionally appropriate data archived in the VADCR Agricultural BMP Database and TMDL document were combined to establish average estimates of control measures required. Bacteria load reductions on land uses was determined through modeling alternative implementation scenarios, defining percentage of land use area or unit amount treated by control measure, then applying related reduction efficiency to the associated load. Additionally, input from local agency representatives, citizens, and contractors were used to verify the analyses.

The assessment of water quality impacts consisted of the development and evaluation of implementation scenarios. Implemental strategies were presented to and evaluated by the Steering Committee. Based on the evaluated strategies, a staged implementation timeline was developed. Implicit in the process of a staged implementation is targeting of control measures. Targeting was proposed to ensure optimum utilization of resources. Modeling was used to evaluate measurable goals and milestones by linking water quality with specific levels of implementation. Through this process, a staged implementation plan was developed that will establish full implementation within 15 years.

STATE AND FEDERAL REQUIREMENTS FOR IMPLEMENTATION PLANS

In developing this implementation plan, both state and federal requirements and recommendations were followed. Virginia's 1997 Water Quality Monitoring, Information, and Restoration Act (WQMIRA) directs the State Water Control Board (SWCB) to "develop and implement a plan to achieve fully supporting status for impaired waters" (§62.1-44.19:4 through 19:8 of the Code of Virginia). WQMIRA establishes that the implementation plan shall include the date of expected achievement of water quality objectives, measurable goals, corrective actions necessary and the associated costs, benefits, and environmental impacts of addressing the impairments.

Section 303(d) of the CWA and current USEPA regulations do not require the development of implementation strategies. USEPA does, however, outline the minimum elements of an approvable IP in its 1999 "Guidance for Water Quality-Based Decisions: The TMDL Process". The listed elements include description of the implementation actions and management measures, timeline for implementing these measures, legal or regulatory controls, time required to attain water quality standards, monitoring plan, and milestones for attaining water quality standards.

USEPA develops guidelines that describe the process and criteria to be used to award CWA Section 319 nonpoint source grants to States. The "Supplemental Guidelines for the Award of Section 319 Nonpoint Source Grants to States and Territories in FY 2003" identifies the nine elements that must be included in the IP to meet the Section 319 requirements:

1. Identify the causes and sources of groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed-based plan;
2. Estimate the load reductions expected to achieve water quality standards;
3. Describe the NPS management measures that will need to be implemented to achieve the identified load reductions;
4. Estimate the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement the watershed-based plan;
5. Provide an information/education component that will be used to enhance public understanding of the project and encourage the public's participation in selecting, designing, and implementing NPS management measures;
6. Provide a schedule for implementing the NPS management measures identified in the watershed-based plan;
7. Describe interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented;
8. Identify a set of criteria for determining if loading reductions are being achieved and progress is being made towards attaining water quality standards, and if not, the criteria for determining if the watershed-based plan needs to be revised; and

9. Establish a monitoring component to evaluate the effectiveness of the implementation efforts.

Once developed, Virginia Department of Environmental Quality (VADEQ) will present the IP to the SWCB for approval as the plan for implementing pollutant allocations and reductions contained in the TMDL. In addition, VADEQ will request the plan be included in the appropriate Water Quality Management Plan (WQMP), in accordance with the CWA's Section 303(e) and Virginia's Public Participation Guidelines for Water Quality Management Planning.

Designated Uses

The "Designation of Uses" of all waters in Virginia is defined in the Code of Virginia (9 VAC 25-260-10) as follows:

"A. All state waters are designated for the following uses: recreational uses (e.g., swimming and boating); the propagation and growth of a balanced indigenous population of aquatic life, including game fish, which might reasonably be expected to inhabit them; wildlife; and the production of edible and marketable natural resources (e.g., fish and shellfish)." (SWCB, 2003)

The goal of the CWA is that all streams should be suitable for recreational uses, including swimming and fishing. **Fecal coliform and *E. coli* bacteria** are used to indicate the presence of pathogens in streams supporting the **swimmable use goal**. Bacteria in South Mayo River, North Fork Mayo River, South Fork Mayo River, Blackberry Creek, Marrowbone Creek, Leatherwood Creek, and Smith River exceed the *E. coli* criterion.

REVIEW OF TMDL DEVELOPMENT STUDY

Bacteria TMDL for the South Mayo River watershed was completed in January 2004 with subsequent approval by USEPA in February 2004. Bacteria TMDLs for the North Fork Mayo River, South Fork Mayo River, Blackberry Creek, Marrowbone Creek, Leatherwood Creek, and Smith River watersheds were completed in September 2008 with subsequent approval by USEPA in December 2008 as part of the Dan River Watershed TMDL. The TMDL development documents can be obtained at the VADEQ office in Roanoke, VA or via the Internet at:

<http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLDevelopment/ApprovedTMDLReports.aspx>.

Impairment description, water quality monitoring, watershed description, source assessment, water quality modeling, and allocated reductions were reviewed to determine implications of TMDL and modeling procedures on IP development.

Watershed Description

Figure 1 depicts watershed boundaries (i.e., all colored areas) draining to impaired segments addressed in the project area of the IP. Marrowbone Creek and Leatherwood Creek impairment watersheds are located in Henry County. South Mayo River, North Fork Mayo River, and South Fork Mayo River impairment watersheds are located in Patrick and Henry Counties. Blackberry Creek, Smith River #1, and Smith River #2 impairment watersheds are predominantly located in Henry County; City of Martinsville; and Patrick County with small portions of the Smith River #1 watershed extending into Floyd County and Franklin County. Table 1 and Figure 2 illustrate landuse distribution within impairment watersheds based on 2001 U.S. Geological Survey National Land Coverage Database (NLCD) data used to develop TMDLs. South Mayo River drains into South Fork Mayo River and joins North Fork Mayo River to form the Mayo River before confluence with Dan River in North Carolina. Blackberry Creek flows southeast and drains into Smith River #1 to backwaters of Martinsville Dam. Smith River #1 forms at Martinsville Dam flowing south with Marrowbone Creek entering from west and Leatherwood Creek entering from east until emptying into Dan River.

Table 1. Watershed area and land use distribution.

Control Measure	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2
Watershed Area (ac)	55,623	70,096	37,984	9,870	19,225	46,762	232,311	16,654
<u>Portion of Watershed Area (%)</u>								
Cropland	2	1	2	<1	<1	<1	<1	1
Pasture	22	17	17	12	15	18	11	19
Residential / Urban	11	4	11	8	8	6	8	17
Water / Wetland	1	<1	<1	<1	1	1	2	1
Forest	74	78	70	80	76	75	79	62

Water Quality Assessment

The impaired portion of South Mayo River (VAW-L43R-01), beginning at the confluence of Russell Creek and continuing downstream approximately 5.77 miles to the confluence with Spoon Creek, is listed as impaired due to water quality exceedances of the bacteria standard at station 4-ASMR016.09.

North Fork Mayo River (VAW-L46R-01) is listed as impaired due to water quality exceedances of the bacteria standard at stations 4-ANMR002.60 and 4-ANMR020.13. The VADEQ has delineated the North Fork Mayo River (VAW-L46R-01) impairment on a stream length of 22.46 miles, beginning at the confluence of Laurel Branch and Polebridge Creek and continuing downstream to the Virginia-North Carolina state line. The South Fork Mayo River (VAW-L45R-01) impaired segment begins at the confluence with Spoon Creek and extends to the Virginia-North Carolina state line, at an approximate length of 10.86 miles. South Fork Mayo River (VAW-L45R-01) is listed as impaired due to water quality exceedances of the bacteria standard at station 4-ASMR004.14.

The impaired portion of Blackberry Creek (VAW-L52R-02), beginning at the headwaters and continuing downstream approximately 14.82 miles to the confluence with Smith River, is listed as impaired due to water quality exceedances of the bacteria standard at station 4-ABRY000.05. Marrowbone Creek (VAW-L55R-01) is listed as impaired due to water quality exceedances of the bacteria standard at station 4-AMRR000.02. The VADEQ has delineated the Marrowbone Creek (VAW-L55R-01) impairment on a stream length of 4.33 miles, beginning at the Henry County PSA Wastewater Treatment Plant and continuing downstream to the Smith River confluence. Leather wood Creek (VAW-L56R-01) impaired segment begins at the City of Martinsville water intake and extends to the Smith River confluence, at an approximate length of 8.34 miles. Leather wood Creek (VAW-L56R-01) is listed as impaired due to water quality exceedances of the bacteria standard at station 4-ALWD002.54.

The impaired portion of Smith River (VAW-L53R-01), beginning at the mouth of Reed Creek and continuing downstream approximately 6.95 miles to the backwaters of Martinsville Dam, is listed as impaired due to water quality exceedances of the bacteria standard at station 4-ASRE033.19. The impaired portion of Smith River (VAW-L54R-01), beginning at Martinsville Dam and continuing downstream approximately 13.77 miles to mouth of Turkey Pen Branch, is listed as impaired due to water quality exceedances of the bacteria standard at stations 4-ASRE015.43 and 4-ASRE021.58. Smith River (VAW-L53R-01) and Smith River (VAW-L54R-01) impairments are referred to Smith River #1 and Smith River #2 in the Watershed Implementation Plan.

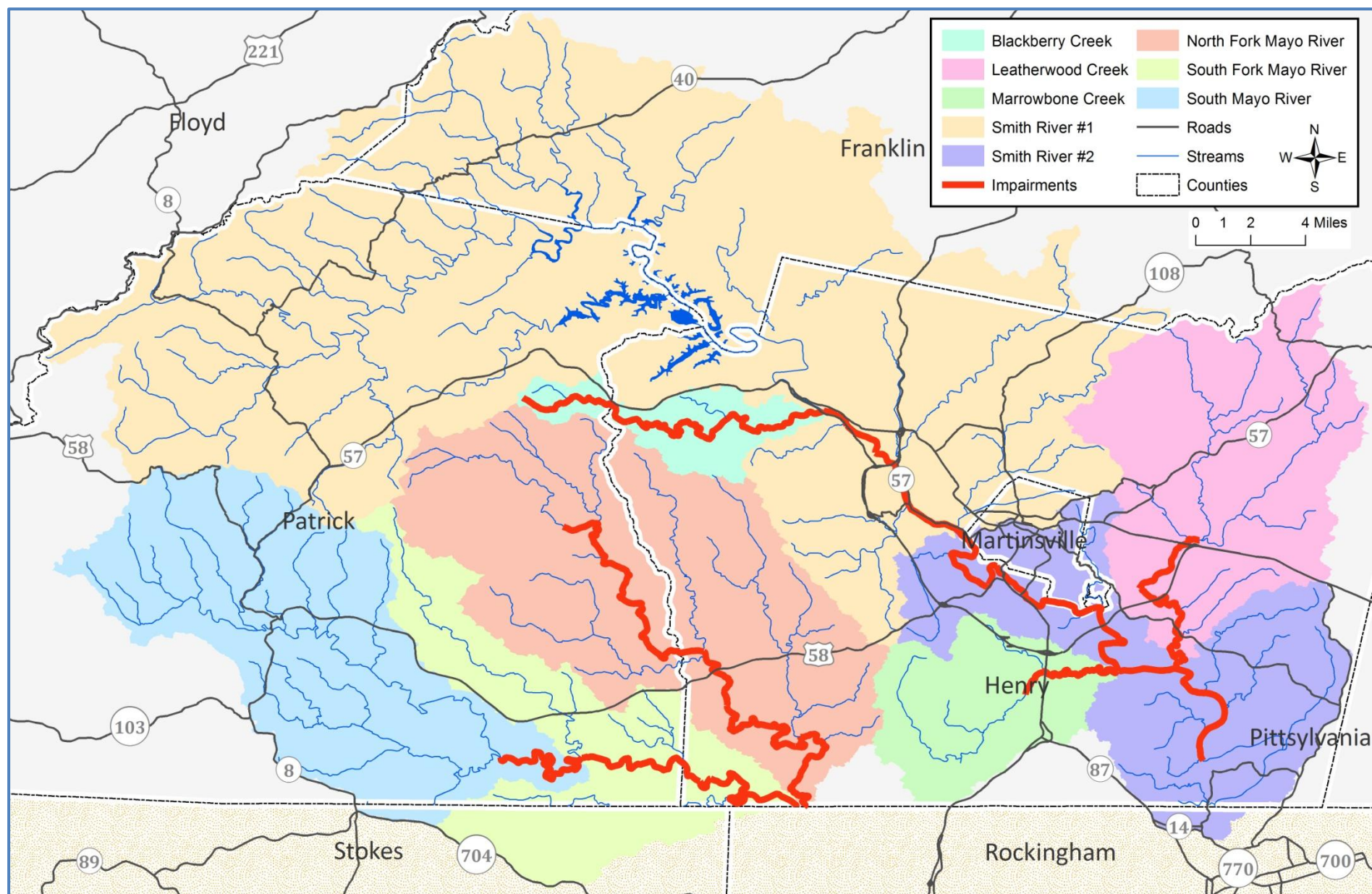


Figure 1. Watersheds location.

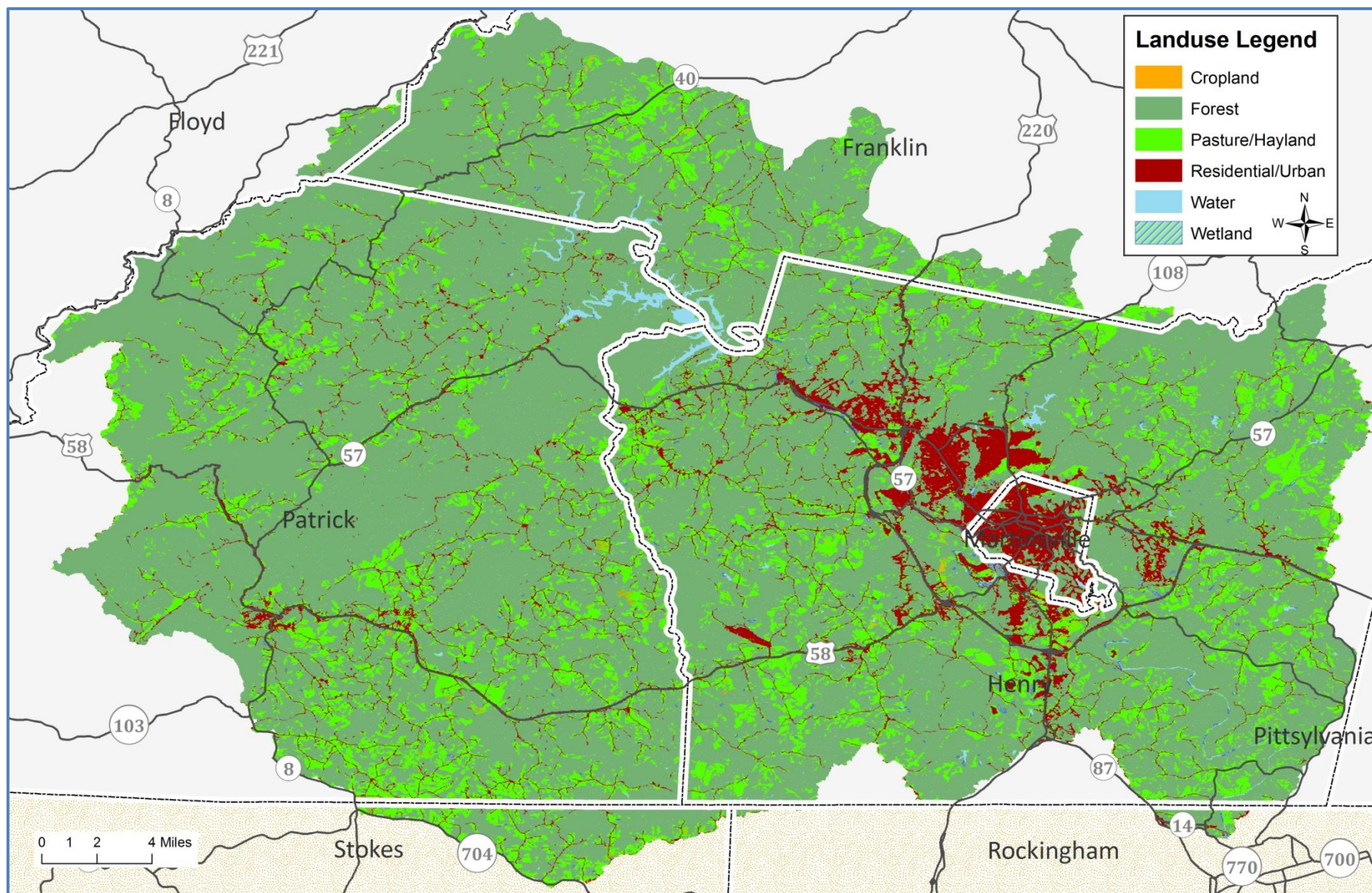


Figure 2. Land uses in the watersheds.

Bacteria Sources

Potential sources of bacteria considered in TMDL development included both point source and nonpoint source contributions. Individual permitted point sources listed in the TMDL development document were assigned a Waste Load Allocation (WLA) based on their Virginia Pollution Discharge Elimination System (VPDES) permit. Non-point bacteria sources from livestock, human, pets, and wildlife were considered in the watersheds. It is important to understand the types of sources modeled their delivery mechanisms, and temporal variations. Table 2 gives a summary of non-point source pollution loads. Loads were represented as either land-based load, where bacteria were deposited on land and available for wash-off during a rainfall event, or as direct loads, where bacteria were directly deposited to the stream. Loads that varied temporally were delivered at a constant rate throughout any given month, but varied on a monthly basis. All loads were spatially distributed based on land use types (e.g. land-based loads from beef cattle were applied to pasture). A portion of the non-point source load from cattle, straight pipes, and a portion of the wildlife load were modeled as a direct load to the stream.

Table 2. Sources of bacteria in the impaired watersheds.

Source Category	Source / Animal Type	Applied To	Variation
Human and Pets	Permitted Discharges	Stream	Temporal and Spatial
Human and Pets	Straight Pipes	Stream	Temporal and Spatial
Human and Pets	Failing Septic Systems	Land	Spatial
Human and Pets	Biosolids Applications	Land	Spatial
Human and Pets	Dogs/Cats	Land	Spatial
Agricultural	Beef	Land, Stream	Temporal and Spatial
Agricultural	Dairy	Land, Stream	Temporal and Spatial
Agricultural	Hogs	Land	Temporal and Spatial
Agricultural	Horses	Land	Temporal and Spatial
Agricultural	Chickens	Land	Temporal and Spatial
Agricultural	Sheep	Land	Temporal and Spatial
Wildlife	Deer	Land, Stream	Spatial
Wildlife	Turkeys	Land, Stream	Spatial
Wildlife	Raccoon	Land, Stream	Spatial
Wildlife	Muskrats	Land, Stream	Spatial
Wildlife	Beavers	Land, Stream	Spatial
Wildlife	Geese	Land, Stream	Spatial
Wildlife	Ducks	Land, Stream	Spatial

Modeling Procedures

In order to understand the implications of the load allocations determined during TMDL development, it is important to understand the modeling methods used in the analysis. The United States Environmental Protection Agency (USEPA) and United States Geological Survey (USGS) Hydrologic Simulation Program - Fortran (HSPF) water quality model was selected as the modeling framework to simulate the bacteria fate and transport for existing conditions and perform TMDL allocations. Seasonal variations in hydrology, climatic conditions, and watershed activities can be explicitly accounted for in the HSPF model. To identify localized sources of bacteria, the watersheds were divided into subwatersheds. These subdivisions were based primarily on homogeneity of land use. The hydrologic model was calibrated using observed flow values from USGS station #02071000 at Smith River near Wentworth, NC for the period January 1995 to December 2005. The calibration period covered a wide range of hydrologic conditions, including low- and high-flow conditions, as well as seasonal variations. The calibrated HSPF data set was validated using observed flow values from USGS station #02075500 at Dan River at Paces, VA for the period January 1995 to December 2005. Calibration parameters were adjusted within the recommended ranges until the model performance was deemed acceptable. Water quality observations between 1998 to 2005 were utilized for the model water quality calibration.

TMDL Allocation and Staged Implementation Reductions

Several model runs were made investigating scenarios that would meet applicable water quality standards for the impairments. The recommended final scenario balances reductions from agricultural and residential land uses by maintaining existing watershed loading characteristics. Loadings from source categories were allocated according to their existing loads. Bacteria loads from point sources were not reduced because these facilities are currently meeting their pollutant discharge limits and other permit requirements. Current permit requirements are expected to result in attainment of the WLAs as required by the TMDL. The final TMDL load reductions required in the impairments are shown in Table 3. Bacteria load reductions required to meet the staged implementation goal (single sample maximum criterion exceedance rate below 10.5%) are listed in Table 4.

Table 3. TMDL-required load reductions (%) specified during TMDL development.

Impairment	Straight Pipes & Failed Septic Systems	Residential / Urban	Livestock Direct Deposit	Pasture	Cropland	Wildlife Direct Deposit	Forest
South Mayo River	98	98	98	98	98	98	98
North Fork Mayo River	100	89	100	89	89	0	0
South Fork Mayo River	100	98	100	98	98	0	0
Blackberry Creek	100	92	100	92	92	0	0
Marrowbone Creek	100	95	100	95	95	9	0
Leatherwood Creek	100	97	100	97	97	24	0
Smith River #1	100	96	100	96	96	64	0
Smith River #2	100	96	100	96	96	64	0

Table 4. Staged implementation required load reductions (%) specified during TMDL development.

Impairment	Straight Pipes & Failed Septic Systems	Residential / Urban	Livestock Direct Deposit	Pasture	Cropland	Wildlife Direct Deposit	Forest
South Mayo River	98	95	98	72	72	0	0
North Fork Mayo River	100	83	100	83	83	0	0
South Fork Mayo River	100	87	100	87	87	0	0
Blackberry Creek	100	88	100	88	88	0	0
Marrowbone Creek	100	91	100	91	91	9	0
Leatherwood Creek	100	89	100	89	89	24	0
Smith River #1	100	89	100	89	89	64	0
Smith River #2	100	89	100	89	89	64	0

Implications of TMDL and Modeling Procedure on Implementation Plan Development

Conditions outlined in the TMDL development study to address the bacteria impairments in the South Mayo River, North Fork Mayo River, South Fork Mayo River, Blackberry Creek, Marrowbone Creek, Leatherwood Creek, and Smith River watersheds include:

- Exclusion of most/all livestock including horses from streams is necessary;
- Substantial land-based NPS load reductions are called for on pasture and cropland;
- All straight pipes and failing septic systems need to be identified and corrected;
- Implicit in the requirement to correct straight pipes and failing septic systems is the requirement to maintain all properly functioning septic systems;
- Reductions to pet bacteria loads on residential land use are necessary;
- Installation of riparian buffers and retention ponds/basins were recommended in the South Mayo River TMDL to achieve land-based residential NPS load reductions; and
- Implicit in the requirement for no point source bacteria load adjustment is the requirement for point sources to maintain permit compliance.

PUBLIC PARTICIPATION

Process

Public participation was an integral part of the IP development, and is also critical to promote reasonable assurance that the implementation actions will occur. The actions and commitments compiled in this document are formulated through input from citizens of the watershed; Patrick County government; Henry County government; City of Martinsville government; Henry County Public Service Authority; Patrick Soil and Water Conservation District (PSWCD); Blue Ridge Soil and Water Conservation District (BRSWCD); West Piedmont Planning District Commission (WPPDC); Piedmont Triad Regional Council; Patrick County Farm Bureau; Dan River Basin Association (DRBA); Virginia Department of Conservation and Recreation (VADCR); Virginia Department of Environmental Quality (VADEQ); Virginia Department of Health (VDH); Virginia Department of Forestry (VADOF); Virginia Cooperative Extension (VCE); Natural Resources Conservation Service (NRCS); United States Army Corps of Engineers; and Blue Ridge Environmental Solutions, Inc. (BRES). Every citizen and interested party in the watershed is encouraged to put the IP into action and contribute what he or she is able to help restore the health of these waterbodies.

Public participation took place during implementation plan development on three levels. First, public meetings were held to provide an opportunity for informing the public as to the end goals and status of the project, as well as a forum for soliciting participation in the smaller, more-targeted meetings (*i.e.*, working groups and Steering Committee). Second, three working groups were formed: Agricultural, Residential/Urban, and Governmental. The overall goal of the Agricultural, Residential/Urban, and Governmental Working Groups was to identify obstacles to implementation in their respective communities and recommend workable solutions that will overcome these obstacles. In addition, the working groups were expected to: identify funding/partnering opportunities that would help to overcome obstacles to implementation, review the IP from an environmental perspective, identify the regulatory authority in the specific areas related to implementation, identify existing programs and resources that might be relevant to the situation, and propose additional programs that would support implementation. A representative from VADCR or BRES coordinated each working group in order to facilitate the process and integrate information collected from the various communities. Third, a Steering Committee was formed with representation from the Agricultural, Residential/Urban, and Governmental Working Groups; Patrick and Henry Counties government; City of Martinsville government; PSWCD; BRSWCD; WPPDC; VADCR; VADEQ; VDH; VADOF; NRCS; and BRES to guide the development of the implementation plan. The Steering Committee had the expressed purpose of formulating the TMDL IP. In addition, this committee had responsibility for identifying control measures that are founded in practicality, establishing a timeline to insure expeditious implementation, and setting measurable goals and milestones for attaining water quality standards. All meetings conducted during the course of the IP development are listed in Table 5. Meeting summaries are located in Appendices A – D. Over 200 man-hours were devoted to attending these meetings by individuals representing agricultural, residential, urban, commercial, environmental, and government interests on a local, state, and federal level.

Table 5. Meetings held during the TMDL IP development process.

Date	Meeting Type	Location	Attendance	Time (hr)
10/16/12	Public Meeting	Horsepasture District Volunteer Fire Department	33	1
10/16/12	Agricultural Working Group	Horsepasture District Volunteer Fire Department	12	1
10/16/12	Residential/Urban Working Group	Horsepasture District Volunteer Fire Department	21	1
12/12/12	Governmental Working Group	Spencer Penn Centre	18	2
01/29/13	Agricultural & Residential/Urban Working Group	Patrick Henry Community College	14	2
01/30/13	Agricultural & Residential/Urban Working Group	Henry County Administration Building	12	2
03/14/13	Steering Committee	Spencer Penn Centre	14	2
03/28/13	Public Meeting	Spencer Penn Centre	21	2

Agricultural Working Group Summary

The Agricultural Working Group (AWG) consisted of representatives from organizations that serve this community and will have a role in implementation (*e.g.*, PSWCD, BRSWCD, NRCS, and VADCR). The AWG is confident that current BMPs eligible for cost-share in TMDL areas and proposed recommendations will provide the necessary incentive for producers and landowners to implement necessary BMPs to meet specified reductions to direct stream, pasture, and cropland bacteria loads. Challenges, recommendations, and keys for success were discussed in the meetings.

Primarily part-time beef and horse operations exist in these watersheds. Full time farming is estimated at less than 30% of farms. Agricultural production is changing based on land use conversion such as cropland to pasture, cropland and/or pasture to forests, etc. Very little tobacco being raised anymore, goat production has increased in the past five years. Two sizeable feedlots exist in Patrick County with a number of stockers; however, these feedlots are not large enough to be considered confined animal feeding operations. No poultry operations in these watersheds. Poultry litter is imported into Henry County from North Carolina and Shenandoah Valley. Poultry litter is imported into Patrick County from North Carolina; however, very little poultry litter imported into Patrick County. It is estimated 50 to 70% of local producers have implemented stream fencing within the two counties. Voluntary BMPs, particularly those that meet specifications, are virtually non-existent in Patrick County. Fence is the most common voluntary BMP because there no restrictions when implemented as a voluntary BMP.

Several AWG participants felt that runoff contributed most to the loading in streams rather than direct deposition. One AWG participant mentioned that cattle prefer clean water over that of streams when

given an option and questioned whether exclusion fence was even needed. Cattle may also utilize shade and water in the stream corridor to cool off. Portable shade structures could provide an option for producers, but are not common in these counties. Participants felt that the major barriers to fencing included buffer requirements gives up too much productive pasture; flood-prone areas require excessive fence maintenance; cost, especially paying upfront ; reluctance to participate in government programs; and many absentee landowners in Patrick and Henry Counties lease property and lessees do not want to commit to BMP lifespan requirements.

The Department of Forestry commented that the cost of reforestation for the FR-1 seemed high. BRESI suggested this may be the average cost of planting pine and hardwood. DOF said that people in this area rarely use hardwoods, and the cost of pine is only about \$175. Stakeholders agreed that a cost of \$175/acre would be more accurate for the area. Patrick SWCD commented that districts now use a cost of \$300/acre for total vegetative cover.

In Patrick County, less than 10% of Environmental Quality Incentives Program (EQIP) applications are funded because this program awards money competitively across the state. Conservation Reserve Enhancement Program (CREP) and state cost share are popular in the North and South Fork Mayo River watersheds. Currently, Patrick County also has some targeted TMDL implementation funds for livestock exclusion practices in this watershed. All of the money received in July 2012 has been allocated for projects. Henry County is not currently CREP eligible but may be once this Implementation Plan is complete. According to NRCS, about two-thirds of EQIP applications from Henry County are funded. The state does offer \$1 per linear foot to maintain cost-share fence after the life span of 10 years has expired with the requirement that the fence be maintained an additional five years. Also, the \$1 per linear foot incentive is available for voluntary installed fence that does not meet fencing standards with a requirement that the fence be maintained for five years. The WP-2T practice has an incentive payment of \$0.50 per linear foot of fence installed to offset fence maintenance costs. The Virginia Outdoors Foundation (VOF) has shown interest in Patrick County. The PSWCD has agreed to be co-holder of easements in the area. In Virginia, landowners who place perpetual easements on their land may be eligible for Federal tax deductions and state tax credits. Working group participants suggested that the DRBA and Trout Unlimited may be able to help fund agricultural practices in the watershed.

Residential/Urban Working Group Summary

The Residential/Urban Working Group (RUWG) consisting of watershed residents and; Patrick and Henry Counties; City of Martinsville; WPPDC; DRBA; PSWCD; BRSWCD; VADCR; VADEQ; and VDH personnel; focused on means to educate and involve public with regard to implementing corrective actions to replace straight pipes, correct failing septic systems, and manage pet waste. Challenges, recommendations, and keys for success were discussed in the meetings.

The RUWG participants suggested that most residents don't practice regular maintenance of their systems and aren't concerned with problems unless they have back-ups into their homes. Septic tank pump-outs would be an effective way to identify failing septic systems and those in need of repair. There is no septic tank pump-out ordinance in Patrick County, Henry County, or the City of Martinsville. Residents in both counties may be intimidated by perceived financial costs and potential repercussions

associated with approaching the Health Department to address on-site sewage disposal system issues. RUWG participants felt strongly that cost share for pump-outs, repairs, and replacements would be very effective in encouraging people to come forward with problems. Septic haulers may leave flyers as a form of outreach to notify residents of funding.

It was suggested the Foley Mountain area off of Polebridge Road in the North Mayo watershed may have increased risk of failing septic systems and/or straight pipes, but residents in that area may not be receptive to education/repair programs. Several sewage lagoons exist in the watershed, including a lagoon servicing several trailers off of Wells Hollow Road, but several participants thought those homes may have recently been connected to public sewer. There are no sewer extensions currently planned in Henry County; however, five potential areas have been identified. In Patrick County, the Patrick Springs sewer line extension is complete, but there are still homes in the area not hooked up to the line. Another sewer line is slated for the West End of Stuart (at the intersection of Routes 8 and 58) to service about six businesses there.

Pet waste education and disposal programs should be limited to highly-concentrated residential areas in the watershed, as well as parks, trails, and confined canine units (i.e., kennels, veterinary clinics, animal shelters, etc.). Patrick County stakeholders mentioned two veterinarian offices in the Mayo River watershed that may benefit from a Confined Canine Unit (CCU) Waste Treatment System. Henry County stakeholders said animal shelters and veterinarians within county were either on public sewer or had a VDH-designed onsite sewage disposal system. No hunt clubs or kennels were identified by stakeholders in either meeting.

RUWG participants were not aware of any stormwater BMPs in Henry County. The Patriot Centre Industrial Park in Martinsville has retention ponds to control runoff. In Patrick County, sedimentation ponds collect flow from public sewers in Stuart.

RUWG participants felt that outreach and education could both be best achieved through announcements and articles in local newspapers (The Enterprise in Patrick County and Martinsville Bulletin) and distribution of flyers via companies offering septic tank pump-outs. Representatives from a local TV station (WGSR47) and radio station (WZBB) were present for the meeting and suggested they could assist with advertising, as well.

West Piedmont Planning District Commission (WPPDC) has gathered partners to develop a proposal for the 2012 TMDL Implementation grant. They are seeking funding for residential (septic) BMPs, citizen monitoring, and vegetated riparian buffer installation in the Patrick County portion of the North and South Mayo River watersheds. Blue Ridge Soil and Water Conservation District (BRSWCD) has applied for the 2012 TMDL Implementation grant requesting funds for residential (septic) and agricultural BMPs in portions of the Smith River, as well as the Leatherwood Creek, and Marrowbone Creek watersheds. Local agencies that may be able to assist with Residential/Urban education and funding include Support to Eliminate Poverty (STEP), Southeast Rural Community Assistance Project (SERCAP), Dan River Basin Association (DRBA), and the Harvest Foundation.

Governmental Working Group Summary

The Governmental Working Group (GWG) consisting of representatives from Patrick County; Henry County; City of Martinsville; PSWCD; BRSWCD; WPPDC; VADCR; VADEQ; VDH; NRCS; and BRES personnel, focused on funding sources, technical assistance needs, regulatory controls, and lead agencies responsible for implementation.

State and federal agricultural cost-share funds received for Patrick and Henry Counties are allocated and disbursed by the PSWCD and BRSWCD. Farm Service Agency (FSA) is currently taking applications for Conservation Reserve Enhancement Program (CREP), but no money is allocated to the program. CREP applications are ranked for funding from a statewide pool; money is not allocated by County or District. Unlike state cost-share, participants may receive partial reimbursement as they complete each conservation practice. Environmental Quality Incentives Program (EQIP), especially in the Mayo River watershed is used primarily to help fund cattle exclusion and watering systems. EQIP is sometimes partnered with state cost-share to maximize the benefit to the farmer. Typically, the Virginia Agricultural Cost-share Program reimburses the producer a percentage of the cost of approved practices, though the state recently announced that it will offer 100% cost-share for select livestock exclusion practices during the current fiscal year. Patrick SWCD recently received money to fund the Livestock Exclusion Initiative project aimed at excluding livestock from streams in TMDL watersheds. Stakeholders anticipate this will reduce the number of applications for federal funding of similar practices. Both NRCS representatives felt participation in federal programs could be improved by more outreach; but they don't have the time to do that. Henry County NRCS could use more assistance in making available options known to farmers; several County representatives offered suggestions and assistance for advertising in the future. Agricultural stakeholders present agreed that the most positive marketing result comes from word of mouth shared among producers.

Stakeholders felt strongly that pump-outs help to identify systems in need of repair; it was recommended that grant funding for pump-outs be sought as part of the implementation process. The housing boom in Henry County peaked 30-40 years ago, indicating many systems may be at risk for failure. Shrinking lot sizes make it difficult to fit adequate drain fields on properties; this problem may also arise during repairs on small lots (especially row houses). Some areas may require alternative waste disposal systems. VDH personnel suggested that fears of high permitting fees deterred residents from approaching them about septic repairs. The permit for installing an OSDS costs \$425, but this is waived for repairs. Often, people can't afford repair costs. It was suggested that SERCAP might be able to further subsidize such projects. Neither Patrick County nor Henry County requires residents to hook up to sewer lines. If Henry County were able to further extend lines, such a policy may be reinstated. The Henry County Capital Improvement Plan includes sewer extensions; however, there is currently no funding for such projects. Henry County has three lagoon systems that they would like to take off line and connect houses directly to sewerage. This would cost several million dollars in funds the county does not currently have. There are still OSDS within Martinsville City Limits. Residents with OSDS pay a monthly fee to the city and must connect to sewer if their OSDS fails. The implementation plan should include "connections to sewer" as a means of remediating failing septic systems. Stakeholders would

like to seek funding to help identify areas where sewer connection would be the most beneficial. Blue Ridge SWCD has experience with residential cost-share from the Pigg and Blackwater Rivers Implementation Plans and would be willing to pursue future funding in the Smith River and tributaries. Dan River Basin Association (DRBA) is well respected in the area. Local stakeholders would consider them an asset in managing implementation grant funds in the area. West Piedmont PDC may not be able to support staffing needs for such a project.

It was suggested that Jack Dalton and the Smith River Sports Complex, both areas in Henry County where people may walk dogs, already have signage about picking up after pets. Stakeholders suggested “Activate Martinsville-Henry County” would be a good place to find additional parks and trails where signage and pet waste stations could be implemented. Patrick County also has one park and two trails. Martinsville-Henry County SPCA could assist with a pet waste education program. The Patrick County Animal Pound has a septic system with a fur filter operating for about 10 years without any known problems.

Areas of need in Patrick County, Henry County, and Martinsville are eligible to receive Appalachian Regional Commission (ARC) construction funds. Tobacco commission funds are available in the area, but are generally aimed at promoting economic development. They may not be a good fit for implementation projects. Community Development Block Grants have been pursued for Henry County sewer extensions in the past. Housing and community development may be able to assist with residential projects; such funding usually requires in-kind match (“sweat equity”). Although the Harvest Foundation does fund health initiatives, their focus is mainly on physical activity. Also, they do not offer services that replace government functions and are unlikely partners for residential implementation.

Regulatory controls discussed: **Agricultural Stewardship Act (ASA)** – ASA is a complaint-driven bad-actor law administered by Virginia Department of Agriculture and Consumer Sciences (VDACS) which relies on either their own staff or SWCDs to investigate reported water quality problems concerning nutrients, sediment and toxins from agricultural activities. **Sewage Handling and Disposal Regulations** – VDH administers these regulations which results in enforcement actions to eliminate discharges from straight pipes and repair or replace failing septic systems. These regulations define gray water as sewage that needs to be treated. There are no pump-out ordinances in the watersheds, though it was pointed out that many mortgage lenders require a pump-out at the time of home sale. The WPPDC questioned if a pump-out ordinance would be worthwhile, citing backlash in Franklin County where residents must provide paperwork to verify required pump-outs have occurred. A new sewer ordinance is being developed that would require new development in Henry County to have proper grease treatment technology. Existing problems are traced back to the source, and the PSA works with the property owner to rectify the problem.

Several VADEQ trend stations are located in the watershed, including 4ANMR002.60 (Rte. 629), 4ASRE007.90 (Rte. 622 Bridge), 4ASRE033.19 (Rte. 701), 4ASRE043.54 (Rte. 674), 4ASMR075.69 (Rte. 708 bridge), and 4ASMR016.09 (Rte. 700 bridge). Trend stations are sampled every year, either monthly or bimonthly. Non-trend, or “rotating,” stations are monitored monthly or bimonthly for a cycle of two

years on, four years off. Several stations in the watershed, including those in Leatherwood Creek and Smith River are in the 2013-14 monitoring plan to be monitored according to the “rotating” schedule. Other stations in the watershed won’t be monitored again until BMPs have been in place. VADEQ monitoring can be supplemented by citizen monitoring. TMDL Implementation grants through DCR often include funding for such monitoring programs.

Existing or planned activities, studies, and planning efforts in the watershed: Eden Watershed Assessment (DRBA) – an IP-like study on a small watershed in the North Carolina portion of the Smith River watershed; Martinsville-Henry County Rivers and Trails Recreational Use Plan; VADCR – Mayo River State Park study revealed rare mussels in the South Mayo River; and Henry County PSA conducted a source water protection plan study near Philpott Reservoir dam. A number of agricultural issues were identified through this process.

Steering Committee Summary

The Steering Committee consisted of representatives from the AWG, RUWG, and GWG; Patrick County; Henry County; City of Martinsville; PSWCD; BRSWCD; WPPDC; DRBA; VADCR; VADEQ; VDH; NRCS; and BRES. Steering Committee evaluated recommendations from working groups, reviewed BMP quantification and cost estimates, revised implementation plan document, and evaluated materials for final public meeting. The Steering Committee will periodically revisit implementation progress and suggest plan revisions as needed.

IMPLEMENTATION ACTIONS

Identification of Control Measures

An important element of the implementation plan is to encourage voluntary implementation of control measures for bacteria reductions on the part of local, state, and federal government agencies, agricultural producers, business owners, and private citizens. In order to encourage voluntary implementation, the best information available on types of control measures and program options that achieve the bacteria reduction goals practically and cost-effectively was obtained. Potential control measures were identified through Steering Committee and working group input; literature review; and discussion with the PSWCD, BRSWCD, NRCS, VADCR, VADEQ, VDH, Henry County, and City of Martinsville government personnel. Control measures were assessed based on cost, availability of existing funds, reasonable assurance of implementation, and water quality impacts (Table 6).

The cost of installing potential control measures was determined based on published values and discussion with working groups, Steering Committee, PSWCD, BRSWCD, NRCS, VADCR, VADEQ, VDH, and local contractors. Control measures that can be promoted through existing programs were identified, as well as control measures that are not currently supported by existing programs and their potential funding sources. Availability of existing programs was determined through discussion with PSWCD, BRSWCD, VADCR, VADEQ, VDH, NRCS, and officials from Henry County and City of Martinsville participating in the working groups and Steering Committee. The assurance of implementation of specific control measures was assessed through discussion with the AWG, RUWG, and GWG.

The allocations determined during the TMDL development dictate, largely, the control measures that must be employed during implementation. In order to meet the stated reductions in direct deposition from livestock, some form of stream exclusion is necessary. Fencing is the most obvious choice, however, the type of fencing, distance from the stream bank, and most appropriate management strategy for the fenced pasture are less obvious. Accounting for this variability at each farm, a full livestock exclusion system was used to estimate the control measure needed to reduce livestock direct deposition.

Due to the treatment capacity of a 35-foot buffer along the streambank, it is preferred that all fence, even that which is installed solely at the landowners expense, be placed at least 35 feet from the stream. The LE-2 livestock exclusion system with 10-foot set-back was included to address farmers wanting to minimize fencing costs and the amount of pasture lost. An alternative water source will typically be required with the livestock exclusion system. SWCD and NRCS staffs have assisted with the installation of various types of alternative water systems, including; wells, spring developments, pumped stream water, and public water. The main criterion is that the system be dependable. From an environmental perspective, the best management scenario would be to exclude livestock from the stream bank 100% of the time and establish permanent vegetation in the buffer area. This prevents livestock from eroding the stream bank, provides a buffer for capturing pollutants in runoff from the pasture, and establishes (with the growth of streamside vegetation) one of the foundations for healthy aquatic life. From a livestock production perspective, the best management scenario is one that

provides the greatest profit to the farmer. Obviously, taking land (even a small amount) out of production is contrary to that goal. However, a clean water source has been shown to improve weight gain. Clean water will also improve the health of animals (e.g., cattle and horses) by decreasing the incidence of waterborne illnesses and exposure to swampy areas near streams. Additionally, intensive pasture management, which becomes possible with an alternative water source, has been shown to improve overall farm profitability and environmental impact. From a part-time farmer's perspective, the best management scenario is one that requires minimal input of time. This would seem to preclude intensive pasture management; however, those farmers who have adopted an intensive pasture management system typically report that the additional management of the established system amounts to "opening a gate and getting out of the way" every couple of days. Additionally, the efficient use of the pasture often means that fewer supplemental feedings are necessary. Among both part-time and full-time farmers there are individuals who are hesitant to allow streamside vegetation to grow unrestricted because of aesthetic preferences or because they have spent a lifetime preventing this growth.

Improved Pasture Management BMPs will be utilized to reduce bacteria loads from pasture land-use. If needed, retention ponds will be installed during Stage II of implementation for additional treatment of the stormwater runoff from pasture land. Conversion of cropland field borders to vegetated buffers or forest and manure incorporation into the soil will be utilized to reduce bacteria loads from cropland. Average parameters of the SL-1 Permanent Vegetative Cover and FR-1 Reforestation of Erodible Crop and Pastureland BMPs previously installed in the PSWCD and BRSWCD areas as reported in the VADCR BMP Database were utilized. Manure incorporation or injection is a practice in which farmers inject liquid manure below the soil surface or spread manure, then disk the land. The disking mixes manure with soil and has shown to keep manure and nutrients on the land longer. This practice can be done on cropland or pasture/hay land use where manure or biosolids are applied.

Septic system repair, conventional septic system installation, and alternative on-site sewage disposal system installation will be needed to fix failed septic systems and replace straight pipes. Pet contributions to bacteria runoff from residential land use will be reduced through implementation of pet waste control program in the watersheds, installation of pet waste enzyme digesting composters, installation of confined canine unit waste treatment systems, and installation of vegetated buffers, rain gardens and infiltration trenches.

Table 6. Control measures with average unit cost and reduction efficiency identified to meet implementation goals for bacteria reductions.

Control Measure	Unit	Unit Cost ¹ (\$)	Reduction Efficiency (%)
<u>Pasture and Livestock Exclusion</u>			
Livestock Exclusion System (CREP)	System	27,000	50 (100) ²
Livestock Exclusion System (EQIP)	System	25,000	50 (100) ²
Livestock Exclusion with Riparian Buffers (LE-1T)	System	25,000	50 (100) ²
Small Acreage Grazing System (SL-6AT)	System	9,000	50 (100) ²
Livestock Exclusion with Reduced Setback (LE-2T)	System	17,000	50 (100) ²
Stream Protection (WP-2T)	System	5,000	50 (100) ²
CREP Watering System Extension (SL-7T)	System	10,000	50 (100) ²
Improved Pasture Management ³	Acres-Installed	75	50
Retention Ponds	Acres-Treated	150	75
<u>Cropland</u>			
Dry Manure Storage Facility	System	75,000	99
Permanent Vegetative Cover on Cropland (SL-1)	Acres - Installed	300	75
Reforestation of Erodible Crop and Pastureland (FR-1)	Acres - Installed	175	75
Manure/Litter Incorporation into Soil	Acres - Installed	25	100
<u>Onsite-Sewage Disposal Systems</u>			
Septic Tank Pump-out	System	250	N/A
Septic System Repair	System	3,000	100
Connection of OSDS to Public Sewer	System	2,000	100
New Conventional Septic System	System	6,000	100
New Conventional Septic System with Pump	System	8,000	100
Alternative Onsite Sewage Disposal System	System	15,000	100
<u>Pet Waste Management</u>			
Pet waste education program	Program	5,000	50
Pet waste digesters	System	50	50
Confined canine unit (CCU) Waste Treatment System	System	20,000	100
<u>Stormwater Runoff Best Management Practices</u>			
Vegetated Buffers	Acres-Installed	400	50
Bioretention	Acres-Treated	15,000	90
Infiltration Trench	Acres-Treated	11,300	90
<u>Technical Assistance</u>			
Agricultural	Full Time Equivalent	50,000 / yr	N/A
Residential	Full Time Equivalent	50,000 / yr	N/A

¹ Unit cost = installation or one-time incentive payment, ² Direct load reduction efficiency in parentheses;

³ Improved pasture management comprised of Pasture Management, Pasture and Hayland Planting (512), and Prescribed Grazing (528) BMPs.

Quantification of Control Measures

An assessment was conducted to quantify actions and costs for two implementation stages. Actions and costs that translate to an instantaneous standard exceedance rate of 10.5% or less, resulting in removal of these streams from the Virginia Water Quality Assessment 305(b)/303(d) Integrated Report, were quantified. This is referred to as the Stage I implementation goal. The Stage II implementation goal is full attainment with the TMDL source load reductions. Estimated units presented in Tables 9 to 12 depict the Stage I and Stage II goals. The quantity of control measures, or BMPs, recommended during implementation was determined through spatial analyses and modeling alternative implementation scenarios. Spatial analyses of land use, stream-network, and the Commonwealth of Virginia aerial maps along with regionally appropriate data archived in the VADCR Agricultural BMP Database and TMDL document were utilized to establish average estimates of control measures to reduce bacteria loads in the watersheds. Additionally, input from local agency representatives, citizens, and contractors were used to verify the analyses.

Agricultural Implementation Needs

To estimate the exclusionary fencing requirements, the National Hydrography Dataset (NHD) stream network was overlaid on aerial photography. Open areas were identified as having the potential to support livestock. Not every pasture area has livestock on it at any given point in time. However, it is assumed that all pasture areas have the potential for livestock access. Additionally, livestock will occasionally be given access to areas identified as cropland (e.g., following the last cutting of hay for the season) and forest. Perennial stream segments that flowed through or adjacent to pasture (open) areas were identified. If the stream segment flowed through the pasture area, it was assumed that fencing was required on both sides of the stream, while if a stream segment flowed adjacent to the pasture area; it was assumed that fencing was required on only one side of the stream. This initial classification was updated by examining land use criteria, size of resultant pasture, and existing BMPs. The PSWCD, BRSWCD, and NRCS were consulted to further update the potential fencing designations based on existing system installations and local knowledge of the watershed. Additionally, the AWG was asked to provide input at the second meeting. Analysis results for portion of South Fork Mayo River watershed are displayed in Figure 3. Overall results for the watersheds are depicted in Figures 4 and 5. There are approximately 2,241 miles of perennial streams in these watersheds. Currently in these watersheds, approximately 61 miles of exclusion fencing have been installed. Exclusion fencing necessary to prevent access to perennial streams and meet the stated TMDL reductions was estimated at approximately 539 miles of fence (Table 7).

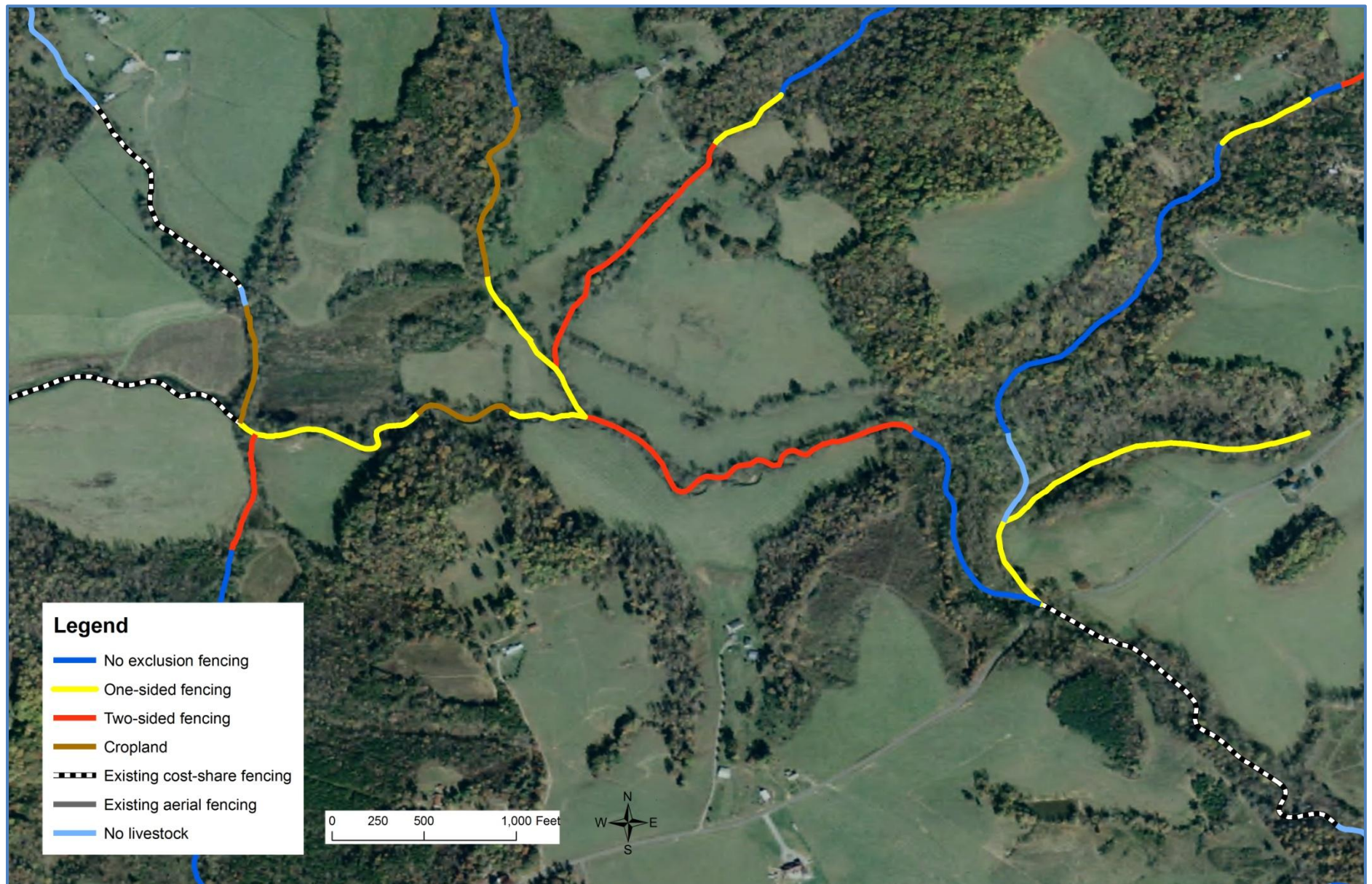


Figure 3. Potential livestock exclusion fencing analysis results for portion of South Fork Mayo River.

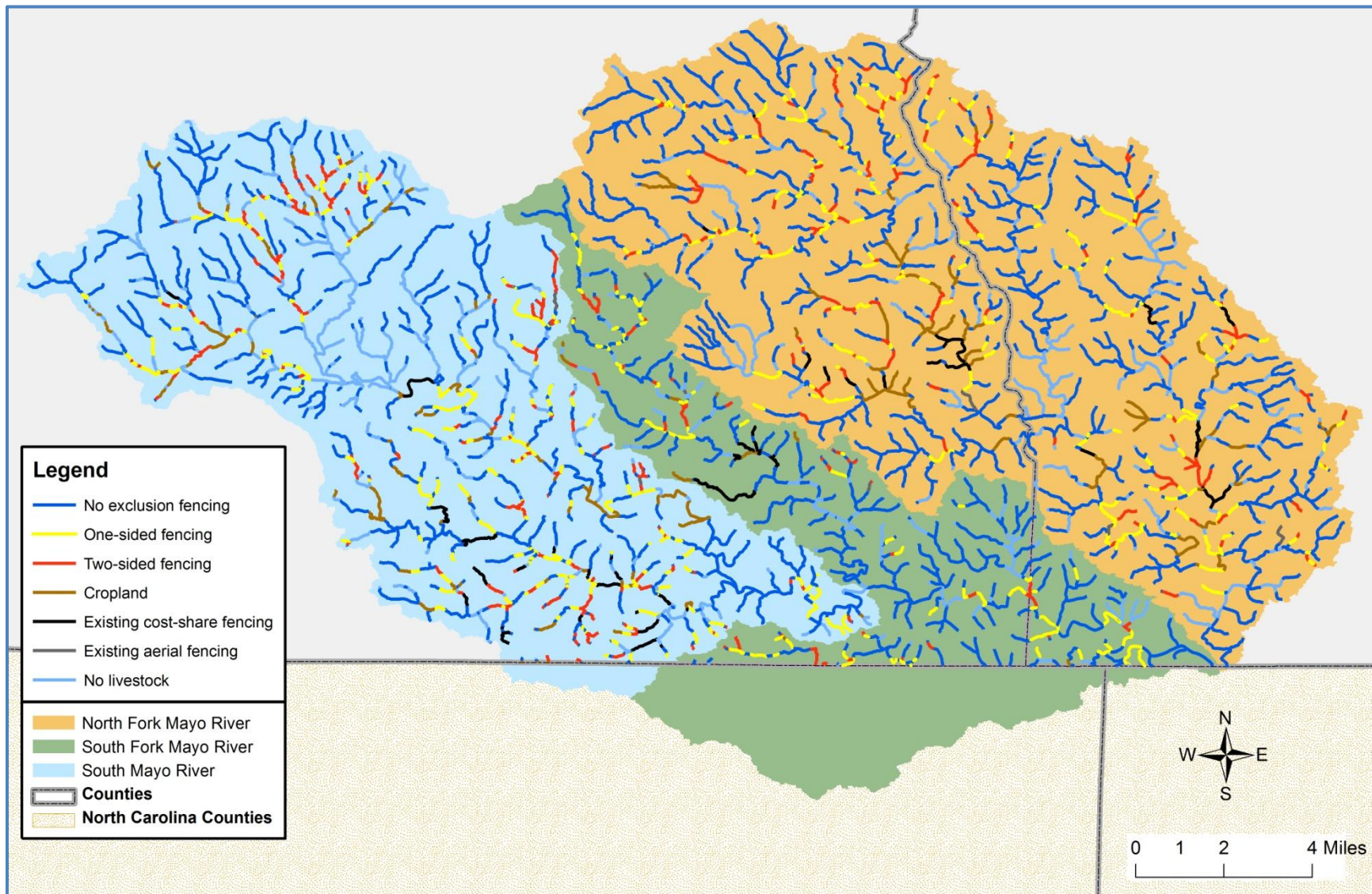


Figure 4. Potential livestock exclusion fencing analysis results for the South Fork Mayo River watersheds.

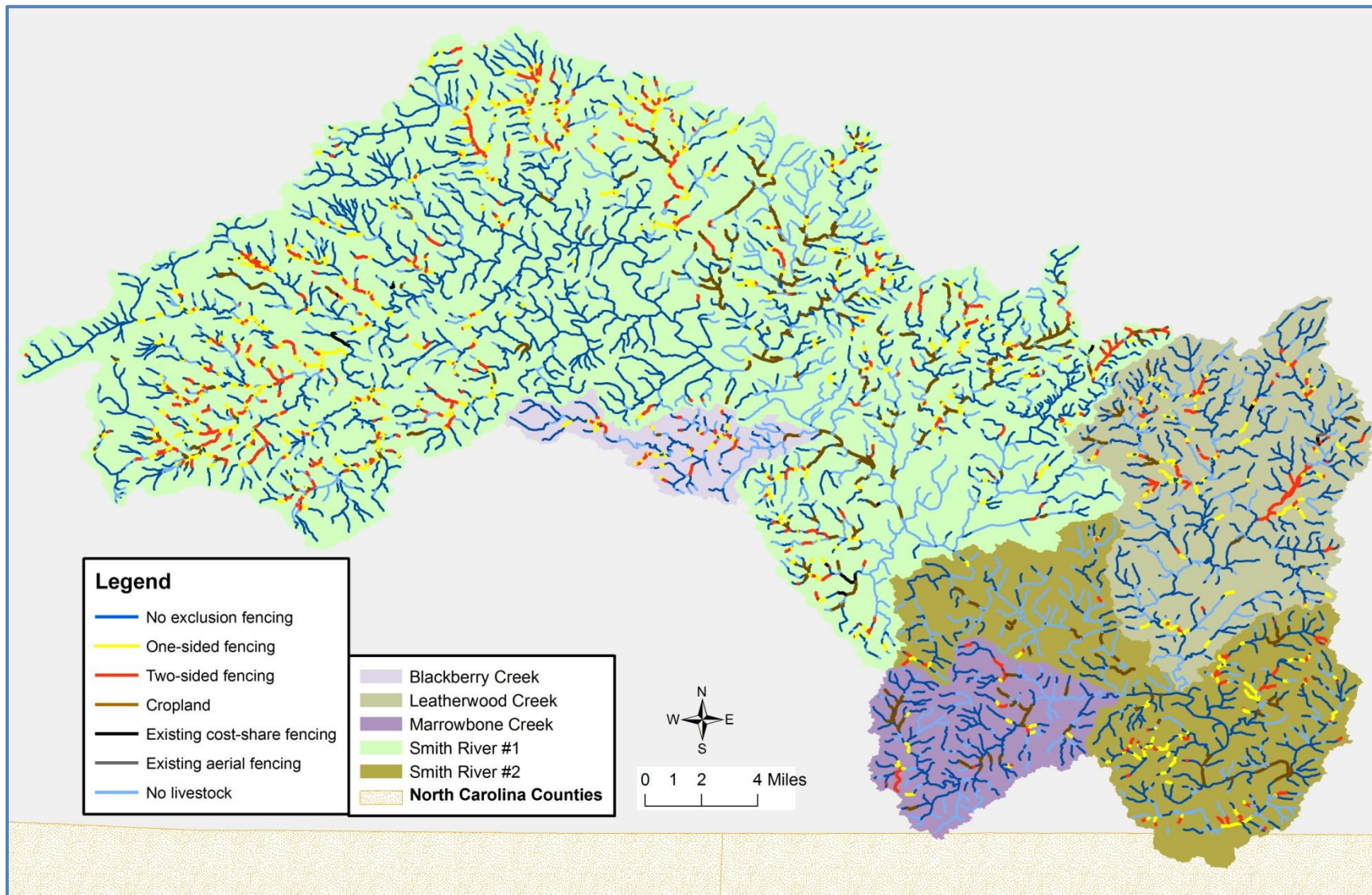


Figure 5. Potential livestock exclusion fencing analysis results for the Smith River watersheds.

Table 7. Perennial stream length, existing fencing installed, and estimated exclusion fencing length needed in the impairments

Measure	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Perennial stream length, mi	253.9	321.4	115.8	43.0	95.3	211.1	1,001.1	199.9	2,241.4
Existing exclusion fencing, ft	99,801	94,826	40,796	0	535	32,438	50,486	3,580	322,462
One-sided fencing needed, ft	155,126	170,250	73,686	14,490	11,320	61,139	376,169	52,320	914,501
Two-sided fencing needed, ft	256,572	292,721	76,637	46,306	36,463	173,751	951,865	96,980	1,931,295
Total fencing needed, ft (mi)	411,698 (78.0)	462,971 (87.7)	150,323 (28.5)	60,795 (11.5)	47,783 (9.0)	234,891 (44.5)	1,328,034 (251.5)	149,301 (28.3)	2,845,796 (539.0)
Fencing per stream length, %	21	19	18	17	6	13	16	10	n/a

The VADCR Agricultural BMP Database was utilized to determine typical characteristics (e.g., streamside fencing length per practice) of full livestock exclusion systems leading to the quantification of the number of required systems. The database was queried for information on livestock exclusion systems installed in the BRSWCD and PSWCD districts. Average streamside fencing for incentive programs used to estimate livestock exclusion system quantity are listed in Table 8. An SL-6 system was categorized based on funding program, CRSL-6 (CREP) versus SL-6 (VA Agricultural BMP Cost-share Program). The query was limited to exclusion systems with “linear feet” as the “extent installed”. Potential streamside fencing was divided by the average streamside length per system to estimate a total of 1,335 exclusion systems are needed to insure full exclusion of livestock from the streams. In order to provide implementation options to producers, several cost-share programs with varying goals and requirements were included. Based on historical cost-share program participation and working group feedback, total exclusion systems were divided between Conservation Reserve and Enhancement Program (CREP), Environmental Quality Incentives Program (EQIP), Livestock Exclusion with Riparian Buffers (LE-1T), Livestock Exclusion with Reduced Setback (LE-2T), Small Acreage Grazing System (SL-6AT), Stream Protection (WP-2T), and Support for Extension of CREP Watering Systems (SL-7T) (Tables 9 and 10). A typical LE-1T system includes streamside fencing, cross-fencing for pasture management, hardened crossing, alternative watering system, watering trough, water distribution piping, and a 35-ft buffer from the stream.

Table 8. Average streamside fencing and division of incentive programs used to estimate livestock exclusion system quantity and cost.

Program / Practice Code	Average Streamside Fencing per System (ft)	Program Division (%)
Livestock Exclusion System (CREP)	2,550	10
Livestock Exclusion System (EQIP)	1,850	20
Livestock Exclusion with Riparian Buffers (LE-1T)	2,250	50
Small Acreage Grazing System (SL-6AT)	1,750	1
Livestock Exclusion with Reduced Setback (LE-2T)	2,100	18
Stream Protection (WP-2T)	1,200	1
CREP Watering System Extension (SL-7T)	2,550	½ of CREP Systems

In order to address the pasture bacteria load reductions, the benefit of installing the livestock exclusion systems was calculated. A reduction efficiency of 100% was assumed for the buffered area (i.e. fenced out pasture) coupled with 50% efficiency for upland area twice that of the buffered area. Using these efficiencies, the area treated by the buffer was calculated for each watershed. The ratio of the buffered area bacteria load and the applied bacteria load from the TMDL was calculated for pasture livestock access. The bacteria load contributed from grazing animals and transported to stream during precipitation events from the remaining pasture land use would be managed using improved pasture management BMPs. Total of 71,637 acres in the watershed would require Improved Pasture Management with portions of this acreage improved by the Pasture and Hayland Planting (NRCS Code

512) and Prescribed Grazing (NRCS Code 528) BMPs. Given reductions were not sufficient to meet TMDL reduction goals, installation of retention ponds may be necessary to treat runoff from this acreage during Stage II of implementation.

The AWG decided the primary control measure for cropland bacteria load reduction will be permanent conversion of cropland to pasture and forest land uses. The conversion was divided between SL-1 Permanent Vegetative Cover and FR-1 Reforestation of Erodeable Crop and Pastureland BMPs based on input from AWG and landuse difference. Additionally, manure incorporation into soil was needed in the watersheds. The VADCR Agricultural BMP Database was utilized to determine typical characteristics of SL-1 and FR-1 systems installed in the BRSWCD and PSWCD areas. Currently in these watersheds, approximately 450 cropland acres have been converted utilizing the SL-1 (127 ac) and FR-1 (323 ac) practices. Converting 28 acres to pasture and 56 acres to forest land uses and incorporating manure into soil on approximately 1,625 cropland acres during Stage I & II satisfied the TMDL goal (Tables 9 & 10). There may be two opportunities in the South Fork Mayo River watershed to utilize a dry manure storage facility.

Table 9. Estimation of control measures needed to meet pasture and cropland bacteria load reduction Stage I (years 1-12) implementation goals

Pasture and Livestock Exclusion Control Measures	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Livestock Exclusion System (CREP)	System	16	18	6	2	3	10	52	6	113
Livestock Exclusion System (EQIP)	System	45	50	16	7	5	25	144	6	308
Livestock Exclusion System (LE-1T)	System	92	103	33	14	10	52	295	33	632
Livestock Exclusion System (SL-6AT)	System	2	3	1	0	0	1	8	1	16
Livestock Exclusion System (LE-2T)	System	35	40	13	5	4	20	114	13	244
Livestock Exclusion System (WP-2T)	System	3	3	2	1	0	2	10	1	22
CREP Watering System Extension (SL-7T)	System	8	9	3	1	1	5	26	3	56
Improved Pasture Management ¹	Acres ²	9,436	9,360	5,092	880	2,196	6,539	20,488	3,315	57,306
Retention Ponds	Acres ³	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Cropland Control Measures	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Permanent Vegetative Cover on Cropland (SL-1)	Acres ²	8.0	1.6	4.0	0.8	0.8	2.4	3.2	1.6	22.4
Reforestation of Erodible Crop and Pastureland (FR-1)	Acres ²	8.0	4.0	4.0	0.8	0.8	1.6	19.2	6.4	44.8
Manure Incorporation into Soil	Acres ²	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dry Manure Storage Facility	System	1	1	0	0	0	0	0	0	2
Technical Assistance	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Agricultural – Pasture and Cropland	FTE ⁴	--	--	--	--	--	--	--	--	1/yr

¹ Improved pasture management comprised of Pasture Management, Pasture and Hayland Planting (512), and Prescribed Grazing (528) BMPs.; ² Acres installed; ³ Acres treated; ⁴ Full time equivalent

Table 10. Estimation of control measures needed to meet pasture and cropland bacteria load reduction Stage II (years 13-15) implementation goals.

Pasture and Livestock Exclusion Control Measures	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Livestock Exclusion System (CREP)	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Livestock Exclusion System (EQIP)	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Livestock Exclusion System (LE-1T)	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Livestock Exclusion System (SL-6AT)	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Livestock Exclusion System (LE-2T)	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Livestock Exclusion System (WP-2T)	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CREP Watering System Extension (SL-7T)	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Improved Pasture Management ¹	Acres ²	2,360	2,340	1,275	22	551	1,636	5,121	825	14,330
Retention Ponds	Acres ³	5,638	3,920	3,316	376	1,461	4,218	10,982	1,594	31,505
Cropland Control Measures	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Permanent Vegetative Cover on Cropland (SL-1)	Acres ²	2.0	0.4	1.0	0.2	0.2	0.6	0.8	0.4	5.6
Reforestation of Erodible Crop and Pastureland (FR-1)	Acres ²	2.0	1.0	1.0	0.2	0.2	0.4	4.8	1.6	11.2
Manure Incorporation into Soil	Acres ²	1,000	95	225	0	0	33	209	47	1,625
Dry Manure Storage Facility	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Technical Assistance	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Agricultural – Pasture and Cropland	FTE ⁴	--	--	--	--	--	--	--	--	1/yr

¹ Improved pasture management comprised of Pasture Management, Pasture and Hayland Planting (512), and Prescribed Grazing (528) BMPs.; ² Acres installed; ³ Acres treated; ⁴ Full time equivalent

Residential Implementation Needs

Number of straight pipes and failing septic systems to correct during implementation was established during TMDL development. Based on discussion with Virginia Department of Health and RUWG, it was assumed that 80% of the straight pipes would be replaced with a conventional septic system, 10% replaced with conventional septic system with pump, and 10% replaced with an alternative on-site sewage disposal system (OSDS). Failing septic systems were assumed to be corrected by connecting to public sewer or repairing the existing septic system (70%), installing a new conventional septic system (25%), installing a new conventional septic system with pump (3%), or installing a new alternative OSDS (2%). The RUWG and GWG felt strongly that septic tank pump-outs, estimated at number of failing septic systems and straight pipes (about 4% of houses with OSDS), help to identify systems in need of repair and would be needed to identify and correct all failing septic systems and straight pipes. It is estimated that 754 septic tank pump-outs, 69 connections to public sewer, 351 septic system repairs, 269 conventional septic systems, 36 conventional septic systems with pump, and 29 alternative OSDS are considered necessary to correct straight pipes and failing septic systems during implementation (Table 11).

A three-step program was proposed to address pet waste reductions. In the first step, a pet waste control program consisting of educational packets, signage, and disposal stations in public areas will be instituted in each watershed. Activate Martinsville-Henry County” would be a good place to find additional parks and trails where signage and pet waste stations could be implemented. Patrick County also has one park and two trails. The second step will be installing pet waste enzyme digesting composters at 565 residences. An initial estimate of 10% of all residences would utilize a composter was determined to be high by RUWG and GWG members. The estimate was then varied based on housing density in the watersheds, resulting in a variation of <1% in South Mayo River to about 3% in Leatherwood Creek. The third step will be identification of confined canine units (CCU) and installing approximately five CCU waste treatment systems throughout the watersheds. The installation of vegetated buffers, bioretention, and infiltration trenches during Stages I & II on residential land use to reduce bacteria load contributed from pets and transported to streams during precipitation events are outlined in Tables 11 & 12.

Other Potential Implementation Needs

Implicit in the TMDL is the need to avoid increased delivery of pollutants from sources that have not been identified as needing a reduction and from sources that may develop over time. Future residential development was identified as a potential source to deliver bacteria to streams through additional septic systems and pets. Care should be taken to monitor these activities and the impact on water quality. This needs to be carefully considered during permit issuance, site plans, and development.

Table 11. Estimation of control measures needed to meet residential/urban and onsite sewage disposal systems bacteria load reduction Stage I (years 1-12) implementation goals.

Failing Septic Systems Control Measures	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Septic Tank Pump-out	System	39	87	33	16	37	86	222	82	602
Septic System Repair	System	22	56	23	11	21	53	108	57	351
Connection OSDS to Public Sewer	System	5	5	0	0	5	7	47	0	69
New Conventional Septic System	System	10	21	8	4	9	21	56	21	150
New Conventional Septic System with Pump	System	1	3	1	1	1	3	7	2	19
Alternative Onsite Sewage Disposal System	System	1	2	1	0	1	2	4	2	13
Straight Pipe Control Measures	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Septic Tank Pump-out	System	5	18	5	4	9	22	49	40	152
New Conventional Septic System	System	3	14	3	3	7	18	39	32	119
New Conventional Septic System with Pump	System	1	2	1	1	1	2	5	4	17
Alternative Onsite Sewage Disposal System	System	1	2	1	0	1	2	5	4	16
Pet Waste Management Control Measures	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Pet Waste Education Program	Program	1*	*	*	1**	**	**	**	**	2
Pet Waste Digesters	System	5	30	10	15	10	80	405	10	565
Confined Canine Unit Waste Treatment System	System	2	0	0	0	1	0	2	0	5
Residential/Urban Best Management Practices	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Vegetated Buffers	Acres ²	3.2	1.0	0.8	0.9	0.9	1.6	40.0	4.8	53.2
Bioretention	Acres ³	4.0	0.7	0.4	0.6	0.6	0.6	120.0	2.8	129.7
Infiltration Trench	Acres ³	0.6	0.7	0.4	0.6	0.6	0.6	4.0	0.8	8.3
Technical Assistance	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Onsite Sewage Disposal Systems	FTE ⁴	--	--	--	--	--	--	--	--	0.9/yr
Pet Waste Management & Residential BMPs	FTE ⁴	--	--	--	--	--	--	--	--	0.1/yr

¹ Unit cost = installation or one-time incentive payment; ² Acres installed; ³ Acres treated; ⁴ Full time equivalent

*One pet waste education program is needed across the combined South Mayo River, North Fork Mayo River, and South Fork Mayo River watersheds.

**One pet waste education program is needed across the combined Blackberry Creek, Marrowbone, Creek, Leatherwood Creek, Smith River #1, and Smith River #2 watersheds.

Table 12. Estimation of control measures needed to meet residential/urban and onsite sewage disposal systems bacteria load reduction Stage II (years 13-15) implementation goals.

Failing Septic Systems Control Measures	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Septic Tank Pump-out	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Septic System Repair	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Connection OSDS to Public Sewer	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
New Conventional Septic System	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
New Conventional Septic System with Pump	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Alternative Onsite Sewage Disposal System	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Straight Pipe Control Measures	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Septic Tank Pump-out	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
New Conventional Septic System	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
New Conventional Septic System with Pump	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Alternative Onsite Sewage Disposal System	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pet Waste Management Control Measures	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Pet Waste Education Program	Program	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pet Waste Digesters	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Confined Canine Unit Waste Treatment System	System	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Residential/Urban Best Management Practices	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Vegetated Buffers	Acres ²	0.8	0.0	0.2	0.1	0.1	0.4	10.0	1.2	12.8
Bioretention	Acres ³	6.0	0.3	0.6	0.4	0.4	0.4	180.0	4.2	192.3
Infiltration Trench	Acres ³	0.4	0.3	0.6	0.4	0.4	0.4	6.0	1.2	9.7
Technical Assistance	Unit	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total
Onsite Sewage Disposal Systems	FTE ⁴	--	--	--	--	--	--	--	--	0.9/yr
Pet Waste Management & Residential BMPs	FTE ⁴	--	--	--	--	--	--	--	--	0.1/yr

¹ Unit cost = installation or one-time incentive payment; ² Acres installed; ³ Acres treated; ⁴ Full time equivalent.

Assessment of Technical Assistance Needs

Members of the AWG, RUWG, GWG, and Steering Committee agree that technical assistance and education are keys to getting people involved in implementation. There must be a proactive approach to contact farmers and residents to articulate exactly what the TMDL means to them and what will most practically get the job done. Several education/outreach techniques will be utilized during implementation. Articles describing the TMDL process, the reasons why high levels of fecal bacteria are a problem, the methods through which the problem can be corrected, the assistance that is currently available for landowners to deal with the problem, and the potential ramifications of not dealing with the problem should be made available to the public through as many channels as possible (*e.g.*, Farm Bureau, SWCD, NRCS, FSA, DRBA newsletters; and targeted mailings). Workshops and demonstrations should be organized to show landowners the extent of the problem, the effectiveness of control measures, and the process involved in obtaining technical and financial assistance.

For the agricultural community, field tours conducted by SWCDs, pasture walks, educational events conducted by Virginia Cooperative Extension, Cattleman's Association events, and information booth at County Fair were recommended. The emphasis was on having local farmers discuss their experiences with the cost-share programs, demonstrating the advantages of clean water source and pasture management, and presenting monitoring results to demonstrate the problem. It is generally accepted that farmers will be more persuaded by discussion with local technical personnel or fellow farmers who have implemented the suggested control measures than through presentations made by state-agency representatives. Notices using all media outlets (*e.g.*, cable television, public access channel programming, newspapers, and links on county, agency, and organization websites) need to be posted regarding status of implementation. Posting of informative/recognition signage throughout watershed (*e.g.*, conservation practices implemented on farm) may prompt neighbors to participate. In general, a proactive approach to education needs to take place, whereby, technicians need to contact each landowner instead of waiting for the landowner to make contact.

For residential issues, public outreach should focus on means to educate and involve public with regard to implementing corrective actions to replace straight pipes, correct failing septic systems, and manage pet waste. Several education/outreach techniques need to be utilized during implementation of corrective actions for straight pipes and failing septic systems. The focus must be on obstacles (*e.g.*, money, information, and understanding of issues) that property owners face in correcting problems and proper operation and maintenance of systems. Examples included: press releases identifying levels of cost-share available for fixing on-site sewage disposal systems problems; small community meetings; workshops; model septic system and video displayed in public buildings; demonstration at county fair; information packet provided through realtors on proper operation and maintenance of on-site sewage disposal systems; educational materials to encourage home owners' associations, veterinarians, kennels, hunt clubs and pet stores to practice and promote proper pet waste management; and mailings.

Technical assistance and educational outreach tasks were identified during plan development that would be needed during implementation. The following tasks associated with agricultural and residential programs were identified:

Agricultural Programs

1. Make contacts with landowners in the watershed to make them aware of implementation goals and cost-share assistance programs.
2. Provide technical assistance for agricultural programs (e.g. survey, design, layout, and approval of installation).
3. Develop educational materials & programs.
4. Organize educational programs (e.g., pasture walks, presentations at field days or club events).
5. Distribute educational materials (e.g., informational articles in FSA or Farm Bureau newsletters, local media).
6. Handle and track cost-share.
7. Assess and track progress toward BMP implementation goals.
8. Follow-up contact with landowners who have installed BMPs.
9. Coordinate use of existing agricultural programs and suggest modifications where necessary.

Residential Programs

1. Identify failing septic systems & straight-pipes (e.g., stream walks, analysis of aerial photos, mailings, monitoring, and home visit).
2. Identify confined canine units (e.g., mailings, County databases, site visit).
3. Track on-site sewage disposal system repairs/ replacements/ installations for human and confined canine units.
4. Handle and track cost-share.
5. Develop educational materials & programs.
6. Organize educational programs and demonstration projects.
7. Distribute educational materials (e.g., informational pamphlets on TMDL & on-site sewage disposal systems).
8. Assess progress toward implementation goals.
9. Follow-up contact with landowners who have participated in the program(s).

To determine the number of full time equivalents (FTE) considered necessary for agricultural and residential technical assistance during implementation, the average cost-share amount of practices needed to be installed per year during implementation was divided by an average cost-share amount that one FTE can process in a year (\$380,000 agricultural and \$135,000 residential). Coupling the number of BMPs processed historically and estimates provided by the SWCDs and Steering Committee, one agricultural FTE per year and one residential FTE per year are needed during Stage I of implementation. The residential FTE was divided between OSDS (90%) and pet waste management program and residential BMPs (10%) resulting in 0.9 FTE per year for OSDS and 0.1 FTE per year for pet waste management program and residential BMPs technical assistance, respectively (Tables 9 and 10).

Cost Analysis

Associated cost estimations for each implementation action were calculated by multiplying the average unit cost (Table 6) per the number of units shown in Tables 9 to 12. Tables 13 and 14 list installation and technical assistance costs to implement agricultural and residential programs for implementation Stages

I and II in all impairments combined. Focusing on Stage I (*i.e.*, removal of impaired stream segments from impaired waters list) costs, the total average installation cost for livestock exclusion systems and improved pasture management is \$36.1 million. The total installation cost for converting cropland to permanent vegetative cover and forest is estimated at \$0.2 million. Accordingly, total agricultural corrective action costs equal \$36.3 million. Estimated corrective action costs needed to replace straight pipes and fix failing septic systems totals \$3.8 million. The cost to implement the pet waste reduction strategies totals an estimated \$0.1 million. Cost to install vegetated buffers, rain gardens, and infiltration trenches during Stage I equal \$2.0 million.

It was determined by the PSWCD, BRSWCD, VADCR, VDH, GWG, and Steering Committee members that it would require \$50,000 to support one technical FTE per year. The total costs to provide assistance in the agricultural and residential programs during Stage I implementation are expected to be both equal to \$0.6 million (Table 15). The total Stage I implementation cost including technical assistance is \$43.4 million with the agricultural cost being \$36.9 million and residential cost \$6.5 million (Table 17). The total Stage II implementation cost including technical assistance is \$9.2 million with the agricultural cost being \$6.0 million and residential cost \$3.2 million (Table 17).

Table 13. Implementation cost for control measures installed addressing livestock access, pasture, and cropland bacteria load reductions in all impairments.

Livestock Exclusion, Pasture, and Cropland Control Measures	South Mayo River Cost (\$)	North Fork Mayo River Cost (\$)	South Fork Mayo River Cost (\$)	Blackberry Creek Cost (\$)	Marrowbone Creek Cost (\$)	Leatherwood Creek Cost (\$)	Smith River #1 Cost (\$)	Smith River #2 Cost (\$)	Total Cost
Livestock Exclusion System (CREP)	432,000	486,000	162,000	54,000	81,000	270,000	1,404,000	162,000	3,051,000
Livestock Exclusion System (EQIP)	1,125,000	1,250,000	400,000	175,000	125,000	625,000	3,600,000	400,000	7,700,000
Livestock Exclusion with Riparian Buffers System (LE-1T)	2,300,000	2,575,000	825,000	350,000	250,000	1,300,000	7,375,000	825,000	15,800,000
Small Acreage Grazing System (SL-6AT)	18,00	27,000	9,000	0	0	9,000	72,000	9,000	144,000
Livestock Exclusion with Reduced Setback System (LE-2T)	595,000	680,000	221,000	85,000	68,000	340,000	1,938,000	221,000	4,148,000
Stream Protection System (WP-2T)	15,000	15,000	10,000	5,000	0	10,000	50,000	5,000	110,000
CREP Watering System Extension (SL-7T)	80,000	90,000	30,000	10,000	10,000	50,000	260,000	30,000	560,000
Prescribed Grazing	885,000	878,000	478,000	83,000	206,000	613,000	1,921,000	311,000	5,375,000
Retention Ponds	846,000	588,000	497,000	56,000	219,000	633,000	1,647,000	239,000	4,725,000
Permanent Vegetative Cover on Cropland (SL-1)	3,000	1,000	2,000	0	0	1,000	1,000	1,000	9,000
Reforestation of Erodible Crop and Pastureland (FR-1)	2,000	1,000	1,000	0	0	0	4,000	1,000	9,000
Manure Incorporation into Soil	25,000	2,000	6,000	0	0	1,000	5,000	1,000	40,000
Dry Manure Storage Facility	75,000	75,000	0	0	0	0	0	0	150,000
Total Installation Cost	6,401,000	6,668,000	2,641,000	818,000	959,000	3,852,000	18,277,000	2,205,000	41,821,000
Technical Assistance Cost	--	--	--	--	--	--	--	--	750,000

Total Livestock Exclusion, Pasture and Cropland Costs: \$42,571,000

Table 14. Implementation cost for control measures installed addressing on-site sewage disposal systems, pets, and stormwater bacteria load reductions in all impairments.

Livestock Exclusion, Pasture, and Cropland Control Measure	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River #1	Smith River #2	Total Cost (\$)
Septic Tank Pump-out	11,000	26,000	10,000	5,000	12,000	27,000	68,000	31,000	190,000
Septic System Repair	66,000	168,000	69,000	33,000	63,000	159,000	324,000	171,000	1,053,000
Connection to Public Sewer	10,000	10,000	0	0	10,000	14,000	94,000	0	138,000
New Conventional Septic System	78,000	210,000	66,000	42,000	96,000	234,000	570,000	318,000	1,614,000
New Conventional Septic System with Pump	16,000	40,000	16,000	16,000	16,000	40,000	96,000	48,000	288,000
Alternative Sewage Disposal System	30,000	60,000	30,000	0	30,000	60,000	135,000	90,000	435,000
Pet waste education program	5,000*	*	*	*	5,000**	**	**	**	10,000
Pet waste digesters	0	2,000	1,000	1,000	1,000	4,000	20,000	1,000	30,000
Confined Canine Unit Waste Treatment System	40,000	0	0	0	20,000	0	40,000	0	100,000
Vegetated Buffers	2,000	0	0	0	0	1,000	20,000	2,000	25,000
Bioretention	150,000	15,000	15,000	15,000	15,000	15,000	4,500,000	105,000	4,830,000
Infiltration Trench	11,000	11,000	11,000	11,000	11,000	11,000	113,000	23,000	202,000
Installation Cost	419,000	542,000	218,000	128,000	274,000	565,000	5,980,000	789,000	8,915,000
Technical Assistance Cost	--	--	--	--	--	--	--	--	750,000

Total On-site Sewage Disposal, Pets, and Stormwater Runoff BMPs Cost: \$9,665,000

*\$5,000 total for one program covering the South Mayo River, North Fork Mayo River, South Fork Mayo River, and Blackberry Creek watersheds

**\$5,000 total for one program covering the Marrowbone Creek, Leatherwood Creek, Smith River #1, and Smith River #2 watersheds

Benefit Analysis

The primary benefit of implementation is cleaner waters in Virginia, where bacteria levels in the South Mayo River, North Fork Mayo River, South Fork Mayo River, Blackberry Creek, Marrowbone Creek, Leatherwood Creek, and Smith River impairments will be reduced to meet water quality standards. Actions during implementation can improve human and livestock herd health, local economies, aquatic ecosystem health, and improved opportunities for recreation.

Human Health

It is hard to gauge the impact that reducing fecal contamination will have on public health, as most cases of waterborne infection are not reported or are falsely attributed to other sources. However, the incidence of infection from fecal sources, through contact with surface waters, should be reduced considerably. The residential programs will play an important role in improving water quality, since human waste can carry with it human viruses in addition to the bacterial and protozoan pathogens potentially found in all fecal matter.

Livestock Herd Health

A clean water source coupled with exclusionary fencing has been shown to improve weight gain; decrease stress; reduce herd health risks associated with increased exposure to water-transmitted diseases, bacteria, virus and cysts infections; reduce mastitis and foot rot; and decrease herd injuries associated with cattle climbing unstable streambanks or being stuck in mud. VADCR publication ***STREAMSIDE LIVESTOCK EXCLUSION: A tool for increasing farm income and improving water quality*** available at http://www.dcr.virginia.gov/stormwater_management/documents/streamsideexcl.pdf or at SWCDS further illustrates these benefits.

Economics

An important objective of the IP is to foster continued economic vitality and strength. Healthy waters can improve economic opportunities for Virginians, and a healthy economic base can provide the resources and funding necessary to pursue restoration and enhancement activities. The agricultural and residential practices recommended in this document will provide economic benefits to the landowner, along with the expected environmental benefits on-site and downstream. For example, installing a livestock stream exclusion system with an alternative (clean) water source, improving pasture condition, performing sewage system maintenance, and improving aesthetics throughout the watershed can have an economic benefit on the local economy. Additionally, money spent by landowners, government agencies, and non-profit organizations in the process of implementing the IP will stimulate the local economy.

The benefit of a Grazing Land Protection System BMP is improved profit through more efficient utilization and harvest of forage by grazing animals. Standing forage utilized directly by the grazing animal is always less costly and of higher quality than the same forage harvested with equipment and fed to the animal. Several factors contribute to greater profitability: stocking rate can usually be increased by 30% to 50%; high-quality, fresh, and unsoiled vegetative growth available throughout the

grazing system increases weight gain per acre; vigor of the pasture sod is improved; and handling and checking grazing animals is easier. More accurate estimates of the amount of forage available, greater uniformity in grazing of pastures, flexibility of harvesting and storing forage not needed for grazing, and extending the length of the grazing season while providing a more uniform quality and quantity of forage throughout the season are important benefits afforded by this system.

In terms of economic benefits to homeowners, an improved understanding of private OSDS, including knowledge of what steps can be taken to keep them functioning properly and the need for regular maintenance, will give homeowners the tools needed for extending the life of their systems and reducing the overall cost of ownership. In addition, investment in the home is protected with a properly functioning sewage disposal system. A home's value can be decreased up to 40% with a failed septic system. The average septic system will last 20-25 years if properly maintained. Proper maintenance includes: knowing the location of the system components and protecting them by not driving or parking on top of them, not planting trees where roots could damage the system, keeping hazardous chemicals out of the system, and pumping out the septic tank every three to five years. The cost of proper maintenance, as outlined here, is relatively inexpensive in comparison to repairing or replacing an entire system.

Improved aesthetics in public areas (*e.g.*, parks) and surrounding businesses provided by control measures (*e.g.*, pet waste kiosks and bioretention) has the potential to draw local citizens and visitors to these areas. In addition, a healthy waterway is vital to the public's recreational enjoyment of the area.

Aquatic Community Improved

Stream bank protection provided through exclusion of livestock including horses from streams will improve the aquatic habitat in these streams. Vegetated buffers that are established will also help reduce sediment and nutrient transport to the stream from upslope locations. The installation of improved pasture management systems should also reduce soil and nutrient losses and increase infiltration of precipitation, thereby decreasing peak flows downstream. Local initiatives, such as riparian easements, will additionally be complemented by actions performed during TMDL implementation.

MEASUREABLE GOALS AND MILESTONES FOR ATTAINING WATER QUALITY STANDARDS

The end goals of implementation are:

- 1) Restored water quality in the impaired waters, and
- 2) Subsequent de-listing of streams from the Virginia Water Quality Assessment 305(b)/303(d) Integrated Report.

Expected progress in implementation is established with two types of milestones: *implementation milestones* and *water quality milestones*. Implementation milestones establish the percentage of control measures installed within certain timeframes, while water quality milestones establish the corresponding improvements in water quality that can be expected as the implementation milestones are met.

Progress toward end goals will be assessed during implementation through tracking of control measure installations by BRSWCD; PSWCD; NRCS; VADCR; VDH; along with Patrick County, Henry County, and City of Martinsville. The VADEQ will continue to monitor and assess water quality for improvement and compliance with Virginia's Water Quality Standards through its Water Quality Monitoring and Assessment Program. Other monitoring project activities in the watershed (*e.g.* citizen monitoring) will be coordinated to augment the VADEQ monitoring program. Implementation will be assessed based on reducing exceedances of the bacteria water quality standard, thereby improving water quality.

Implementation of control measures is scheduled for 15 years and will be assessed in two stages beginning in July 2013 and lasting to June 2028. Stage I is based on meeting source allocations that translate to an instantaneous standard exceedance rate of 10.5% or less resulting in removal of streams from the Virginia Water Quality Assessment 305(b)/303(d) Integrated Report. The Stage II goal is based on implementing source allocations to meet the specified TMDL goal, 0% exceedance of water quality standards. After implementation inception, five milestones will be met in three-year increments until streams are removed from the Virginia Water Quality Assessment 305(b)/303(d) Integrated Report.

Implementation in years one through 12 for agricultural source reductions focuses on installing livestock stream exclusion systems, improving pasture management, and cropland conversion (Table 15). BMPs installed in years 13 through 15 are based on additional treatment of bacteria load not treated during Stage I from pasture and cropland using improved pasture management, cropland conversion, manure incorporation into soil, dry manure storage facilities, and retention ponds (Table 15). Retention ponds are more costly and are logistically more difficult to design and locate on individual farms.

Implementation of residential control measure in years one through 12 focuses on identification and removal of straight pipes, repairing or replacing failed septic systems, instituting pet waste control program, installation of pet waste enzyme digesting composters, installation of confined canine unit (CCU) waste treatment systems, and installation of vegetated buffers (Table 15). Vegetated buffer,

bioretention, and infiltration trench installations are expected to escalate over the last three years (Table 15).

Table 16 lists the cumulative progress towards the TMDL endpoint as implementation milestones are met. Water quality improvement is expected to increase each year. Water quality improvement is expected to increase each year, 36% overall bacteria load reduction is expected at the third year, 48% in the sixth year, 60% in the ninth year, and 73% in the twelfth year. Based on water quality modeling projections, the impairments would be in a probable position to be de-listed from the Virginia Water Quality Assessment 305(b)/303(d) Integrated Report at the fourth milestone. Considering the dynamics of a stream ecosystem and the inherent difficulties that may arise preventing implementation, the final milestone of TMDL allocation attainment was set at 15 years following implementation commencement. Table 17 lists implementation cost associated with percentage of practices installed addressing agricultural and residential practices along with technical assistance needed in these watersheds.

Table 15. Targeted implementation stages for control measures installation.

Pasture and Livestock Exclusion Control Measure	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River 1 & 2
Livestock Exclusion System (CREP)	I	I	I	I	I	I	I
Livestock Exclusion System (EQIP)	I	I	I	I	I	I	I
Livestock Exclusion with Riparian Buffers (LE-1T)	I	I	I	I	I	I	I
Small Acreage Grazing System (SL-6AT)	I	I	I	I	I	I	I
Livestock Exclusion with Reduced Setback (LE-2T)	I	I	I	I	I	I	I
Stream Protection (WP-2T)	I	I	I	I	I	I	I
Support for Extension of CREP Watering System (SL-7T)	I	I	I	I	I	I	I
Improved Pasture Management	I & II	I & II	I & II	I & II	I & II	I & II	I & II
Retention Ponds	II	II	II	II	II	II	II
Cropland Control Measure	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River 1 & 2
Permanent Vegetative Cover on Cropland (SL-1)	I & II	I & II	I & II	I & II	I & II	I & II	I & II
Reforestation of Erodible Crop and Pastureland (FR-1)	I & II	I & II	I & II	I & II	I & II	I & II	I & II
Manure Incorporation into Soil	II	II	II	II	II	II	II
Dry Manure Storage Facility	I	II	I	II	II	II	II
Failing Septic System Control Measure	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River 1 & 2
Septic Tank Pump-out	I	I	I	I	I	I	I
Connection of OSDS to Public Sewer	I	I	I	I	I	I	I
Septic Tank System Repair	I	I	I	I	I	I	I
Septic Tank System Installation/Replacement	I	I	I	I	I	I	I
Septic Tank System Installation/Replacement w/ Pump	I	I	I	I	I	I	I
Alternative On-site Waste Treatment System	I	I	I	I	I	I	I
Straight Pipe Control Measure	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River 1 & 2
Septic Tank System Installation/Replacement	I	I	I	I	I	I	I
Septic Tank System Installation/Replacement w/ Pump	I	I	I	I	I	I	I
Alternative On-site Waste Treatment System	I	I	I	I	I	I	I
Pet Waste Management Control Measure	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River 1 & 2
Pet waste education program	I	I	I	I	I	I	I
Pet waste digesters	I	I	I	I	I	I	I
Confined Canine Unit Waste Treatment System	I	I	I	I	I	I	I
Residential/Urban Best Management Practices	South Mayo River	North Fork Mayo River	South Fork Mayo River	Blackberry Creek	Marrowbone Creek	Leatherwood Creek	Smith River 1 & 2
Vegetated Buffers	I & II	I & II	I & II	I & II	I & II	I & II	I & II
Bioretention	I & II	I & II	I & II	I & II	I & II	I & II	I & II
Infiltration Trench	I & II	I & II	I & II	I & II	I & II	I & II	I & II

Stage I = first 12 years of implementation for a 15-year timeline

Stage II = last three years of implementation for a 15-year timeline

Table 16. Cumulative implementation of control measures and water quality milestones

Pasture Control Measure	Unit	Progress Since TMDL Study	Milestone 1 Completed by June 2016	Milestone 2 Completed by June 2019	Milestone 3 Completed by June 2022	Milestone 4 Completed by June 2025	Milestone 5 Completed by June 2028
Livestock Exclusion System (CREP)	System	26	25	55	85	118	118
Livestock Exclusion System (EQIP)	System	N/A	76	154	232	313	313
Livestock Exclusion System (LE-1T)	System	74	155	313	471	632	632
Livestock Exclusion System (SL-6AT)	System	N/A	4	8	13	16	16
Livestock Exclusion System (LE-2T)	System	N/A	58	20	182	244	244
Livestock Exclusion System (WP-2T)	System	1	4	8	13	22	22
Livestock Exclusion System (SL-7T)	System	N/A	13	28	43	56	56
Improved Pasture Management	Acres - Installed	N/A	14,326	28,652	42,979	57,306	71,637
Retention Pond	Acres - Treated	N/A	0	0	0	0	31,505
Cropland Control Measure	Unit	Progress	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5
Permanent Vegetative Cover on Cropland (SL-1)	Acres - Installed	127	6	11	17	22	28
Reforestation of Erodible Crop and Pastureland (FR-1)	Acres - Installed	232	11	22	34	45	56
Manure Incorporation into Soil	Acres - Treated	N/A	0	0	0	0	1,625
Dry Manure Storage Facility	System	N/A	0	0	0	2	2
Onsite Sewage Disposal Systems Control Measure	Unit	Progress	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5
Septic Tank Pump-out	System	N/A	180	368	558	754	754
Septic System Repair	System	N/A	92	171	272	351	351
Connection to Public Sewer	System	N/A	10	37	42	69	69
New Conventional Septic System	System	N/A	65	131	199	269	269
New Conventional Septic System with Pump	System	N/A	8	17	27	36	36
Alternative Sewage Disposal System	System	N/A	5	12	18	29	29
Pet Waste Management Control Measure	Unit	Progress	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5
Pet waste education program	System	N/A	2	2	2	2	2
Pet waste digesters	System	N/A	139	280	423	565	565
Confined Canine Unit Waste Treatment System	System	N/A	1	3	4	5	5
Stormwater Runoff Control Measure	Unit	Progress	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5
Vegetated Buffers	Acres - Installed	N/A	13	27	40	53	66
Bioretention	Acres - Treated	N/A	0	1	65	129	322
Infiltration Trench	Acres - Treated	N/A	0	1	4	8	18

Impairment	Existing	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5
South Mayo River	45	31	25	19	8	0
North Fork Mayo River	42	37	32	24	8	0
South Fork Mayo River	45	32	27	21	10	0

Blackberry Creek	42	40	34	24	10	0
Marrowbone Creek	48	37	33	27	8	0
Leatherwood Creek	45	42	35	22	11	3
Smith River #1	45	33	30	25	16	8
Smith River #2	48	35	30	18	13	5

Table 17. Implementation cost associated with percentage of practices installed along with technical assistance addressing agricultural and residential needs in the watersheds.

Year	Pasture & Livestock Access (\$)	Cropland (\$)	Agricultural Technical Assistance (\$)	Agricultural Total (\$)	On-site Sewage Disposal System (\$)	Pet Waste (\$)	Residential BMPs (\$)	Residential Technical Assistance (\$)	Residential Total (\$)	Total
1	1,870,000	1,000	50,000	1,921,000	191,000	10,000	1,000	50,000	252,000	2,173,000
2	3,247,000	1,000	50,000	3,298,000	327,000	3,000	1,000	50,000	381,000	3,679,000
3	3,580,000	2,000	50,000	3,632,000	362,000	23,000	3,000	50,000	438,000	4,070,000
4	1,870,000	1,000	50,000	1,921,000	207,000	1,000	1,000	50,000	259,000	2,180,000
5	3,447,000	1,000	50,000	3,498,000	340,000	3,000	1,000	50,000	394,000	3,892,000
6	3,728,000	2,000	50,000	3,780,000	391,000	43,000	5,000	50,000	489,000	4,269,000
7	1,879,000	1,000	50,000	1,930,000	199,000	1,000	256,000	50,000	506,000	2,436,000
8	3,447,000	1,000	50,000	3,498,000	352,000	3,000	256,000	50,000	661,000	4,159,000
9	3,733,000	2,000	50,000	3,785,000	392,000	23,000	502,000	50,000	967,000	4,752,000
10	1,916,000	1,000	50,000	1,967,000	206,000	1,000	256,000	50,000	513,000	2,480,000
11	3,544,000	76,000	50,000	3,670,000	359,000	3,000	256,000	50,000	668,000	4,338,000
12	3,862,000	77,000	50,000	3,989,000	453,000	23,000	504,000	50,000	1,030,000	5,019,000
13	1,828,000	15,000	50,000	1,893,000	0	0	1,005,000	50,000	1,055,000	2,948,000
14	1,828,000	15,000	50,000	1,893,000	0	0	1,005,000	50,000	1,055,000	2,948,000
15	2,144,000	16,000	50,000	2,210,000	0	0	1,007,000	50,000	1,057,000	3,267,000
Stage I Total (1-12)	36,123,000	166,000	600,000	36,889,000	3,779,000	137,000	2,042,000	600,000	6,558,000	43,447,000
Stage II Total (13-15)	5,800,000	46,000	150,000	5,996,000	0	0	3,017,000	150,000	3,167,000	9,163,000
Total (1-15)	41,923,000	212,000	750,000	42,885,000	3,779,000	137,000	5,059,000	750,000	9,725,000	52,610,000

Targeting

The process of a staged implementation implies targeting of control measures, ensuring optimum utilization of resources. The impaired watersheds were divided into subwatersheds during TMDL development to aid modeling procedures (Figure 6). These subdivisions were based primarily on homogeneity of land use. Subdivision can be used during implementation to identify localized sources of bacteria and target control measure installation.

Subwatershed priority ranking was established for potential livestock exclusion fencing based on ratio of animal population and estimated length of fencing per subwatershed (Table 18). The maps and prioritization ranking will help identify farm tracts that BRSWCD and PSWCD should concentrate their efforts in. The appropriate district will coordinate with landowners and track BMP installation progress.

Known problem areas, clusters of older homes, or houses in close proximity to streams known by the VDH will be targeted for on-site sewage disposal system control measures. To assist VDH and district personnel in targeting financial and technical resources, subwatershed priority ranking was established based on total bacteria load from estimated failing septic systems and straight pipes in each watershed (Figures 7 and 8, Table 19). Steps outlined in pet waste management stages results in targeting of source type and resources. Significant exposure to a rain garden and/or infiltration trench project would be attained if installed at schools, county administration buildings, or shopping centers in watershed.

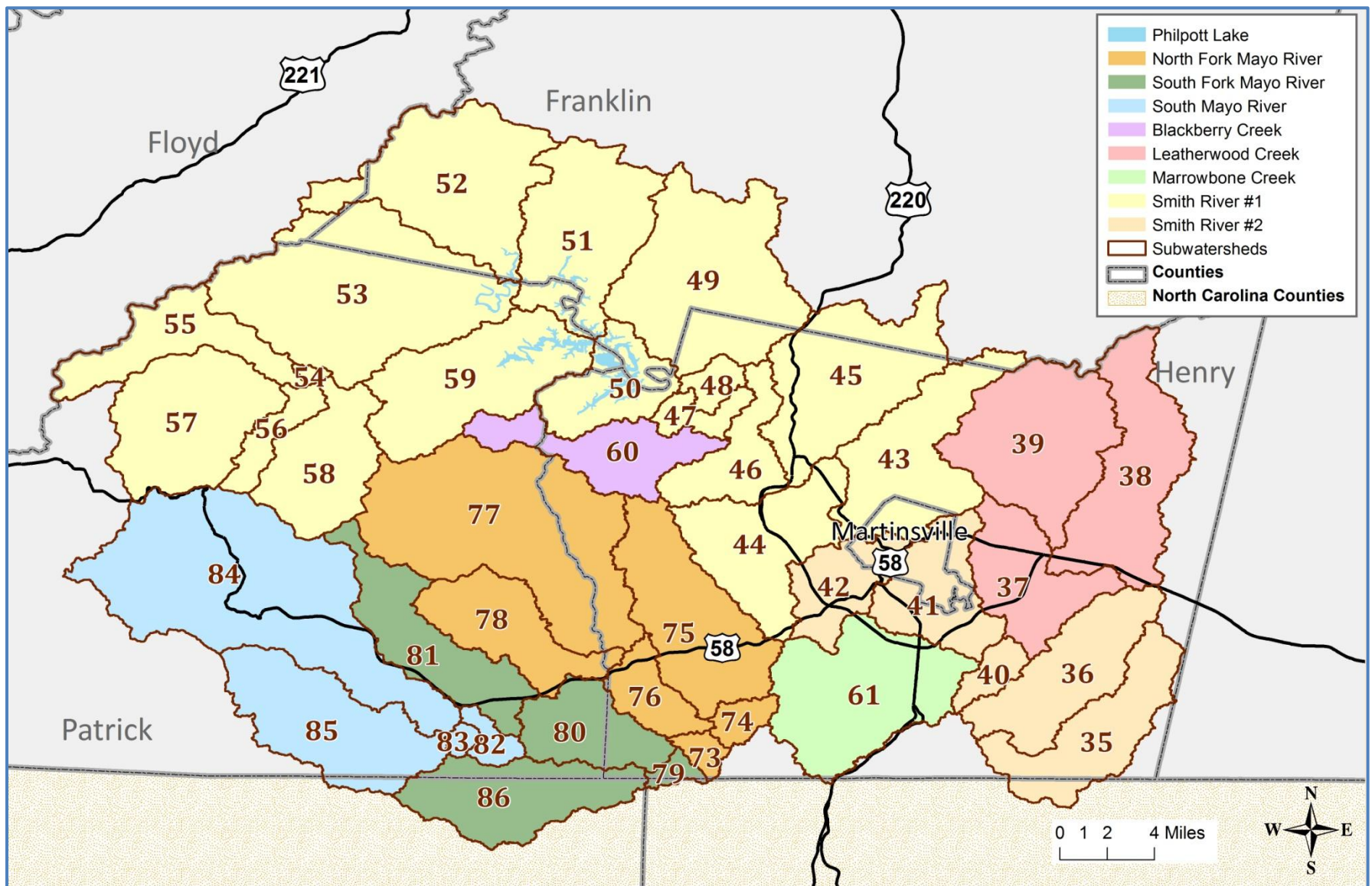


Figure 6. Subwatershed division for impaired watersheds.

Table 18. Subwatershed priority ranking for livestock exclusion fencing installation.

Overall WIP Priority	Subwatershed	Impairment	SWCD Office
1st	84	South Mayo River	Patrick
2nd	77	North Fork Mayo River	Patrick
3rd	57	Smith River #1	Patrick
4th	52	Smith River #1	Blue Ridge
5th	53	Smith River #1	Patrick & Blue Ridge
6th	85	South Mayo River	Patrick
7th	51	Smith River #1	Patrick & Blue Ridge
8th	75	North Fork Mayo River	Blue Ridge
9th	39	Leatherwood Creek	Blue Ridge
10th	38	Leatherwood Creek	Blue Ridge
11th	45	Smith River #1	Blue Ridge
12th	58	Smith River #1	Patrick
13th	49	Smith River #1	Blue Ridge
14th	36	Smith River #2	Blue Ridge
15th	43	Smith River #1	Blue Ridge
16th	81	South Fork Mayo River	Patrick
17th	59	Smith River #1	Patrick
18th	78	North Fork Mayo River	Patrick & Blue Ridge
19th	44	Smith River #1	Blue Ridge
20th	60	Blackberry Creek	Patrick & Blue Ridge
21st	61	Marrowbone Creek	Blue Ridge
22nd	35	Smith River #2	Blue Ridge
23rd	55	Smith River #1	Patrick
24th	80	South Fork Mayo River	Patrick & Blue Ridge
25th	46	Smith River #1	Blue Ridge
26st	56	Smith River #1	Patrick

Overall WIP Priority	Subwatershed	Impairment	SWCD Office
27th	86	South Fork Mayo River	Patrick & Blue Ridge
28th	76	North Fork Mayo River	Blue Ridge
29th	37	Leatherwood Creek	Blue Ridge
30th	82	South Mayo River	Patrick
31st	50	Smith River #1	Blue Ridge
32nd	42	Smith River #2	Blue Ridge
33rd	54	Smith River #1	Patrick
34th	79	South Fork Mayo River	Blue Ridge
35th	74	North Fork Mayo River	Blue Ridge
36th	41	Smith River #2	Blue Ridge
37th	73	North Fork Mayo River	Blue Ridge
38th	48	Smith River #1	Blue Ridge
39th	40	Smith River #2	Blue Ridge
40th	47	Smith River #1	Blue Ridge
41st	83	South Mayo River	Patrick

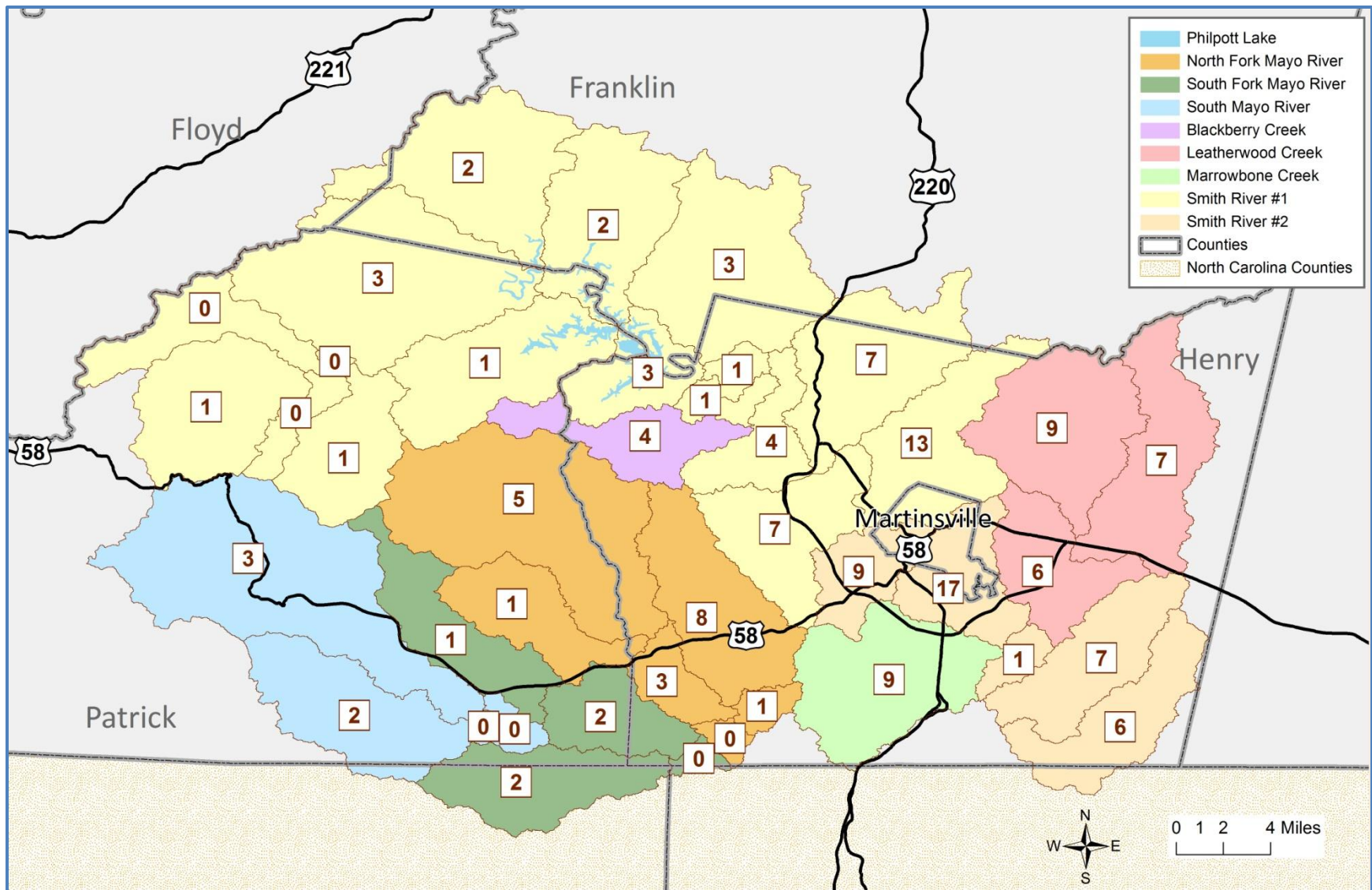


Figure 7. Failed septic system estimates per subwatershed.

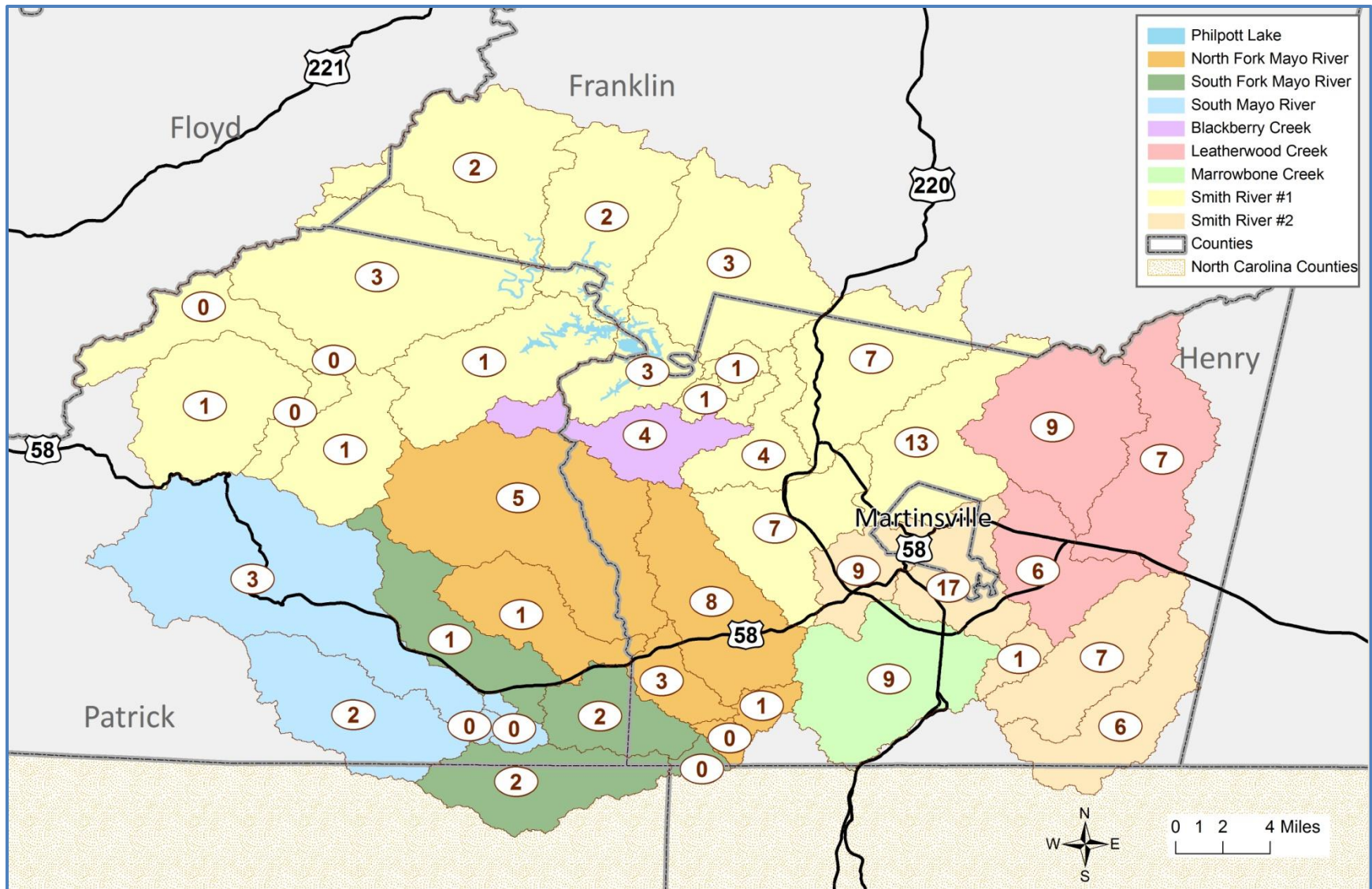


Figure 8. Straight pipe estimates per subwatershed.

Table 19. Subwatershed priority ranking for correcting failing septic systems and replacing straight pipes.

Overall WIP Priority	Subwatershed	Impairment	VDH Office	SWCD Office
1st	41	Smith River #2	Henry & Martinsville	Blue Ridge
2nd	43	Smith River #1	Henry & Martinsville	Blue Ridge
3rd	61	Marrowbone Creek	Henry	Blue Ridge
4th	39	Leatherwood Creek	Henry	Blue Ridge
5th	42	Smith River #2	Henry & Martinsville	Blue Ridge
6th	75	North Fork Mayo River	Henry	Blue Ridge
7th	38	Leatherwood Creek	Henry	Blue Ridge
8th	45	Smith River #1	Henry & Franklin	Blue Ridge
9th	44	Smith River #1	Henry	Blue Ridge
10th	36	Smith River #2	Henry	Blue Ridge
11th	35	Smith River #2	Henry	Blue Ridge
12th	37	Leatherwood Creek	Henry	Blue Ridge
13th	77	North Fork Mayo River	Patrick	Patrick
14th	60	Blackberry Creek	Patrick & Henry	Patrick & Blue Ridge
15th	46	Smith River #1	Henry	Blue Ridge
16th	84	South Mayo River	Patrick	Patrick
17th	53	Smith River #1	Patrick, Franklin & Floyd	Patrick & Blue Ridge
18th	49	Smith River #1	Henry & Franklin	Blue Ridge
19th	50	Smith River #1	Henry & Franklin	Blue Ridge
20th	76	North Fork Mayo River	Henry	Blue Ridge
21st	86	South Fork Mayo River	Patrick & Henry	Patrick & Blue Ridge
22nd	85	South Mayo River	Patrick	Patrick
23rd	52	Smith River #1	Franklin & Floyd	Blue Ridge

Overall WIP Priority	Subwatershed	Impairment	VDH Office	SWCD Office
24th	51	Smith River #1	Patrick & Franklin	Patrick & Blue Ridge
25th	80	South Fork Mayo River	Patrick & Henry	Patrick & Blue Ridge
26st	59	Smith River #1	Patrick	Patrick
27th	57	Smith River #1	Patrick	Patrick
28th	81	South Fork Mayo River	Patrick	Patrick
29th	58	Smith River #1	Patrick	Patrick
30th	78	North Fork Mayo River	Patrick & Henry	Patrick & Blue Ridge
31st	47	Smith River #1	Henry	Blue Ridge
32nd	40	Smith River #2	Henry	Blue Ridge
33rd	74	North Fork Mayo River	Henry	Blue Ridge
34th	48	Smith River #1	Henry	Blue Ridge
35th	55	Smith River #1	Patrick	Patrick
36th	73	North Fork Mayo River	Henry	Blue Ridge
37th	79	South Fork Mayo River	Henry	Blue Ridge
38th	56	Smith River #1	Patrick	Patrick
39th	83	South Mayo River	Patrick	Patrick
40th	82	South Mayo River	Patrick	Patrick
41st	54	Smith River #1	Patrick	Patrick

Water Quality Monitoring

Implementation progress will be evaluated through water quality monitoring conducted by VADEQ through the agency's monitoring program and any additional monitoring support (*i.e.*, citizen monitoring) that may develop as implementation progresses. Monitoring stations are subject to change based upon the development of the VADEQ Monitoring Strategy. Typically, post-IP monitoring begins 2-5 years after BMPs are established. The VADEQ uses the data to determine water quality improvement and gauge the success aimed at reducing the amount of pollutants in the stream of the South Mayo River, North Fork Mayo River, South Fork Mayo River, Blackberry Creek, Marrowbone Creek, Leatherwood Creek, and Smith River watersheds. Monitoring results are accessible by contacting the VADEQ regional office.

Twelve VADEQ monitoring stations were utilized to assess water quality in the South Mayo River, North Fork Mayo River, South Fork Mayo River, Blackberry Creek, Marrowbone Creek, Leatherwood Creek, and Smith River watersheds (Figure 9). Stations are classified as a "trend station" or "watershed station" (Table 20). Trend stations are historically located, long-term water quality monitoring stations used to assess changes in water quality over long periods of time and are sampled every year, either monthly or bimonthly. Watershed stations are typically located near the mouth of a watershed, designed to provide a monitoring presence in smaller watersheds, and sampled 12 times over a consecutive two-year period (sampling occurs every other month) within a six-year rotational cycle. Several stations in the watershed, including those in Leatherwood Creek and Smith River are in the 2013-14 monitoring plan to be monitored according to the rotating schedule. Other stations in the watershed won't be monitored again until BMPs have been in place.

The citizen monitoring program can be utilized to supplement samples collected through VADEQ's monitoring program. The Coliscan Easygel method is a simple to use and relatively inexpensive method that measures total coliform and *E. coli*. The Coliscan Easygel method was compared to laboratory analysis and found to be an acceptable tool for screening purposes although the data cannot be used directly by VADEQ for water quality assessments. This method is important because it can assist in locating "hot spots" for fecal contamination, assess implementation progress, and target areas for more extensive monitoring.

The AWG, RUWG, GWG, and Steering Committee request that monitoring continue at the trend stations and TMDL impairment listing stations for the following parameters: *E. coli* bacteria, temperature, dissolved oxygen, pH, specific conductivity, total nitrogen, total phosphorus, and total suspended solids. Listing stations for South Mayo River, North Fork Mayo River, South Fork Mayo River, Blackberry Creek, Marrowbone Creek, Leatherwood Creek, Smith River #1, and Smith River #2 were 4ASMR016.09, 4ANMR002.6, 4ASMR004.14, 4ABRY000.05, 4AMRR000.02, 4ALWD002.54, 4ASRE033.19, and 4ASRE015.43, respectively (Table 20 and Figure 9).

Table 20. Monitoring station identification, station location, and station type for VADEQ monitoring stations in the watershed.

Station ID	Station Location	Station Type
4ASMR016.09	South Mayo River near Nettle Ridge at Route 700	Trend
4ANMR002.60	North Fork Mayo River near Spencer at Route 629	Trend
4ASMR004.14	South Fork Mayo River at Route 695	Watershed
4ABRY000.05	Blackberry Creek at American Legion Bridge	Watershed
4ASRE075.69	Smith River at Route 708	Trend
4ASRE043.54	Smith River at Route 674 above Town Creek	Trend
4ASRE033.19	Smith River at Route 701 below Fieldcrest Mill	Trend
4AMRR000.02	Marrowbone Creek at Route 642	Watershed
4ALWD002.54	Leatherwood Creek at Route 650	Watershed
4ASRE021.58	Smith River at Route 58 Bypass	Watershed
4ASRE015.43	Smith River at Route 636	Watershed
4ASRE007.90	Smith River at Route 622 (Morgan Ford Bridge)	Trend

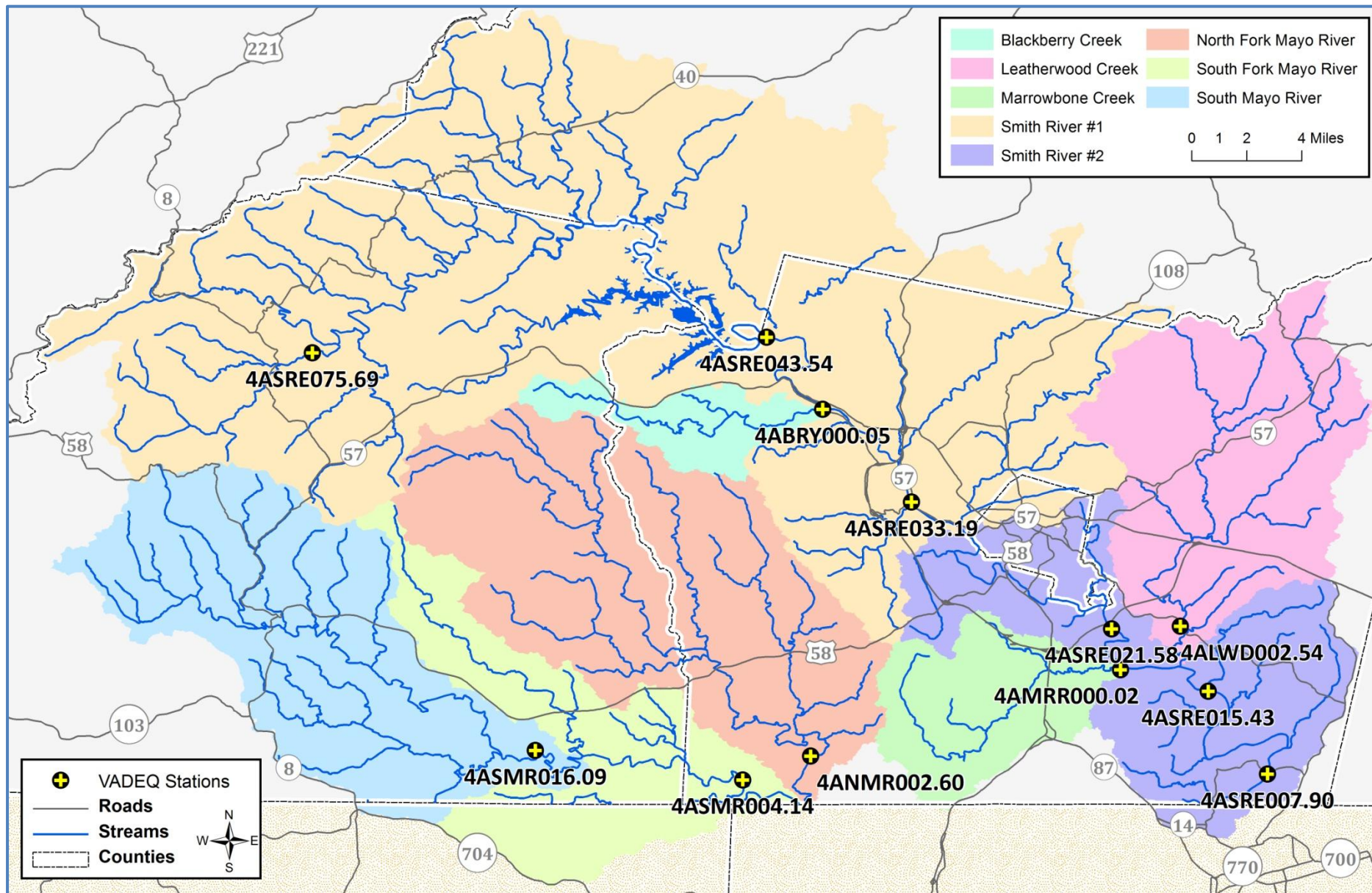


Figure 9. Location of VADEQ monitoring stations in the watersheds.

STAKEHOLDER'S ROLES AND RESPONSIBILITIES

Stakeholders are individuals who live or have land management responsibilities in the watershed, including private individuals, businesses, government agencies, and special interest groups. Successful implementation depends on stakeholders taking responsibility for their role in the process. The primary role falls on the local groups that are most affected; that is, citizens, businesses, and community watershed groups. However, local, state, and federal agencies also have a stake in seeing that Virginia's waters are clean and provide a healthy environment for its citizens. Virginia's approach to correcting non-point source pollution problems continues to be encouragement of participation through education and financial incentives; that is, outside of the regulatory framework. If, however, voluntary approaches prove to be ineffective, it is likely that implementation will become less voluntary and more regulatory.

Regional and local government groups work closely with state and federal agencies throughout the TMDL process; these groups possess insights about their community that may help to ensure the success of TMDL implementation. These stakeholders have knowledge about a community's priorities, how decisions are made locally, and how the watershed's residents interact. [BRSWCD](#) and [PSWCD](#) will have prominent roles during implementation. [BRSWCD](#) and [PSWCD](#) will provide cost-share funds, lead education and technical assistance efforts, and track best management practice implementation for the agricultural and residential programs. The West Piedmont Planning District Commission will coordinate cost-share fund distribution with the districts, lead education and outreach efforts, and report best management practice implementation for the residential program. The Dan River Basin Association will assist in developing volunteer monitoring programs and lead education and outreach efforts.

In the Commonwealth of Virginia, water quality problems are dealt with through legislation, incentive programs, education, and legal actions. State government has the authority to establish state laws that control delivery of pollutants to local waters. Local governments in conjunction with the state can develop ordinances involving pollution prevention measures. In addition, citizens have the right to bring litigation against persons or groups of people who can be shown to be causing some harm to the claimant. Through hearing the claims of citizens in civil court, and the claims of government representatives in criminal court, the judicial branch of government also plays a significant role in the regulation of activities that impact water quality. State agencies conducting regulatory, education, or funding procedures related to water quality in Virginia include: [VADEQ](#), [VADCR](#), [VDH](#), [VADACS](#), [VDGIF](#), [VADOF](#), [VCE](#), and [VOF](#). Governmental, agricultural, residential action items during implementation are included in Tables 21 through 23, respectively. List of acronym used in tables can be found on page 87.

Table 21. Governmental implementation action items.

Source Issues	Actions & Support	Potential Funding Source	Who will assist?
Continual baseline water quality monitoring	Water quality monitoring: ambient/benthic	VADEQ	VADEQ
Supplemental ambient/benthic monitoring	Water quality monitoring: ambient/benthic; coliscan (bacteria monitoring)	VADEQ, VA Naturally, grant, DRBA	SWCD, Citizen Volunteers, DRBA
Local government incentives	Ordinance/code options to improve water quality	Local Government, Grants	Local Government, Planning District Commission (PDC), as appropriate
Inadequate tracking of on-site sewage disposal systems	Develop tracking system; ensure alternative OSDS maintenance agreement in place	VDH, Local Government	VDH

Table 22. Agricultural implementation action items.

Source Issues	Corrective Actions	Potential Funding Source	Who will assist?
Livestock in stream	Livestock exclusion best management practices, Water development upslope	Ag BMP Cost-Share, WQIF, Section 319 Funds, NRCS	SWCD, NRCS
Cropland runoff	Cropland best management practices	Ag BMP Cost-Share, NRCS	SWCD, NRCS
Pasture runoff	Pasture management best management practices	Ag BMP Cost-Share, NRCS	SWCD, NRCS
Streamside runoff	Improved buffers (grass, shrubs, trees)	CREP, EQIP, VDGIF, VADOOF, Ag. BMP Cost-Share	VDGIF, VADOOF, SWCD, NRCS
Lack of BMP knowledge	Ag BMP education, outreach events	WQIF, VCE, NRCS	SWCD, VCE, NRCS
Livestock access to water	Alternate water source	Ag BMP, VADEQ (low interest loan), NRCS	SWCD, VADEQ, NRCS
Targeting locations for fencing	Ground truthing, stream walks	WQIF, grants	SWCD, community interest groups

Table 23. Residential/urban implementation action items.

Source Issues	Corrective Actions	Potential Funding Source	Who will assist?
Lack of septic system maintenance	Regular maintenance	WQIF, NFWF grant, Homeowners, Section 319 Funds	VDH, SWCD, PDC
Septic system failure and/or straight pipes	Septic system repairs, replacement, hook-ups, & maintenance	WQIF, NFWF grant, Homeowners, Block Grants	VDH, Local Government, SWCD, PDC, SERCAP
No septic system pump out tracking	Computerized tracking system	VDH	VDH, Local Government
Need information on system location at time of home sale	State requirement – initiated by Board of Realtors	Homeowners	VDH
Education needed on septic system function	Septic system education program	WQIF, NFWF grant	Realtors, Teachers, VDH, School Groups, Community Interest Groups, PDC
No pet waste management	Education, bag stations, composters, structural practices in concentrated canine areas (kennels)	VCE, SWCD, WQIF, NFWF grant, Roundtables	Interest Groups, Local Governments, Hunt Clubs, Veterinarians, SPCA
Stormwater runoff BMPs	Targeting locations for runoff reduction BMPs	DRBA, grants	DRBA, citizens, volunteers, landowners
Waterfowl impact to ponds	Buffer ponds to discourage waterfowl, especially geese	HOAs, NFWF grant, VDGIF	VADOF, Landowners
Runoff from streamside properties - non-agricultural	Low impact development techniques, install grass/shrub/tree buffers along streams, education on proper land management including erosion control and fertilizer	Homeowners, Developers, NFWF grant, VADOF, Private Foundations	Local Government, VCE, Interest Groups
Best management practices education for horse owners	Pasture management education; alternative watering sources, livestock exclusion	Ag BMPs, VCE, WQIF	SWCD, VCE, Interest Groups

The roles and responsibilities of some of the major stakeholders on a local, state, and federal level are as follows:

BRSWCD and PSWCD: The Blue Ridge and Patrick Soil and Water Conservation Districts are local units of government responsible for the soil and water conservation work within Patrick and Henry Counties. The district's overall role is to increase voluntary conservation practices among farmers, ranchers, and other land users. District staff work closely with watershed residents and have valuable knowledge of local watershed practices. Specific to the IP, the district will provide agricultural cost-share funds, lead education and technical assistance efforts, and track best management practice implementation for the agricultural and residential programs.

Patrick and Henry Counties & City of Martinsville Government Departments: Government staff work closely with local and state agencies to develop and implement the TMDL. Staff will administer the erosion & sediment control and stormwater programs, provide mapping assistance, and may also help to promote education and outreach to citizens, businesses, and developers to introduce the importance of the TMDL process.

Citizens & Businesses: The primary role of citizens and businesses is simply to get involved in implementation. This may include participating in public outreach, implementing BMPs to help restore water quality, and partnering with other stakeholders to improve water quality.

Community Civic Groups: Community civic groups take on a wide range of community service including environmental projects. Such groups include the Ruritan, Farm Clubs, Homeowner Associations and youth organizations such as 4-H and Future Farmers of America. These groups offer a resource to assist in the public participation process, educational outreach, and assisting with implementation activities in local watersheds.

Animal Clubs/Associations: Clubs and associations for various animal groups (*e.g.*, beef, equine, poultry, swine, and canine) provide a resource to assist and promote conservation practices among farmers and other landowners, not only in rural areas, but in residential areas as well.

Dan River Basin Association: DRBA works to: preserve the river corridor with a series of municipal, county, and state parks and trails; increase public access to rivers; build constituency for the rivers and outdoor recreation through monthly outings; protect water quality by instituting stream monitoring across the Basin; promote regional nature and heritage tourism; and bridge boundaries to create a bi-state borderland community.

West Piedmont Planning District Commission: Environmental planning is a long-standing area of emphasis of the WPPDC, which is complementary to the TMDL process. WPPDC continues to promote efficient development of the environment by assisting and encouraging local governmental agencies to plan for the future. WPPDC will support residential implementation with assistance from localities and SWCDs. Additionally, WPPDC will continue to work with VADCR and the Steering Committee to periodically revisit implementation progress and suggest plan revisions as needed.

VADEQ: The State Water Control Law authorizes the SWCB to control and plan for the reduction of pollutants impacting the chemical and biological quality of the State's waters resulting in the

degradation of the recreation, fishing, shellfishing, aquatic life, wildlife, and drinking water uses. For many years the focus of VADEQ's pollution reduction efforts was the treated effluent discharged into Virginia's waters via the VPDES permit process. The TMDL process has expanded the focus of VADEQ's pollution reduction efforts from the effluent of wastewater treatment plants to the pollutants causing impairments of the streams, lakes, and estuaries. The reduction tools are being expanded beyond the permit process to include a variety of voluntary strategies and BMPs. VADEQ is the lead agency in the TMDL process. The Code of Virginia directs VADEQ to develop a list of impaired waters, develop TMDLs for these waters, and develop IPs for the TMDLs. VADEQ administers the TMDL process, including the public participation component, and formally submits the TMDLs to USEPA and the SWCB for approval. VADEQ is also responsible for implementing point source WLAs, regulation of biosolids applications, assessing water quality across the state, and conducting actions related to Virginia's Water Quality Standards.

VADCR: The Virginia Department of Conservation and Recreation is authorized to administer Virginia's NPS pollution reduction programs in accordance with §10.1-104.1 of the Code of Virginia and §319 of the Clean Water Act. Because of the magnitude of the NPS component in the TMDL process, VADCR is a major participant in the TMDL process. VADCR has a lead role in the development of IPs to address correction of NPS pollution contributing to water quality impairments. VADCR also provides available funding and technical support for the implementation of NPS components of IPs. The staff resources in VADCR's TMDL program focus primarily on providing technical assistance and funding to stakeholders to develop and carry out IPs and support to VADEQ in TMDL development related to NPS impacts. Under the Virginia Stormwater Management Program, VADCR is responsible for the issuance, denial, revocation, termination, and enforcement of National Pollutant Discharge Elimination System (NPDES) permits for the control of stormwater discharges from municipal separate storm sewer systems (MS4) and land disturbing activities. VADCR staff will be working with other state agencies, local governments, soil and water conservation districts, watershed groups, and citizens to gather support and to improve the implementation of TMDL plans through utilization of existing authorities and resources.

VDH: The Virginia Department of Health is responsible for maintaining safe drinking water measured by standards set by the USEPA. Their duties also include septic system regulation, driven by complaints. Complaints can range from a vent pipe odor that is not an actual sewage violation and takes very little time to investigate, to a large discharge violation that may take many weeks or longer to effect compliance. For TMDLs, VDH has the responsibility of enforcing actions to correct failed septic systems and/or eliminate straight pipes (Sewage Handling and Disposal Regulations, 12 VAC 5-610-10 *et seq.*).

VADACS: The Virginia Department of Agriculture and Consumer Services Commissioner of Agriculture has the authority to investigate claims that an agricultural producer is causing a water quality problem on a case-by-case basis. If deemed a problem, the Commissioner can order the producer to submit an agricultural stewardship plan to the local SWCD. If a producer fails to implement the plan, corrective action can be taken, which may include civil penalties. An emergency corrective action can be issued if runoff is likely to endanger public health, animals, fish and aquatic life, public water supply, *etc.* An emergency order can shut down all or part of an agricultural activity and require specific stewardship measures.

VDGIF: Virginia Department of Game and Inland Fisheries manages Virginia's wildlife and inland fish to maintain optimum populations of all species to serve the needs of the Commonwealth; provides opportunity for all to enjoy wildlife, inland fish, boating and related outdoor recreation; and promotes safety for persons and property in connection with boating, hunting, and fishing. The VDGIF has responsibility for administering certain U.S. Fish and Wildlife Service funding programs. Personnel participate, review, and comment on projects to insure consideration for fish and wildlife populations and associated habitats.

VADOF: Virginia Department of Forestry has prepared a manual to inform and educate forest landowners and the professional forest community on proper BMPs and technical specifications for installation of these practices in forested areas (www.dof.state.va.us/wq/wq-bmp-guide.htm). Forestry BMPs are intended to primarily control erosion. For example, streamside forest buffers provide nutrient uptake and soil stabilization, which can benefit water quality by reducing the amount of nutrients and sediments that enter local streams.

VCE: Virginia Cooperative Extension is an educational outreach program of Virginia's land grant universities (Virginia Tech and Virginia State University) and a part of the national Cooperative State Research, Education, and Extension Service, an agency of the USDA. VCE is a product of cooperation among local, state, and federal governments in partnership with citizens. VCE offers educational programs and technical resources for topics such as crops, grains, livestock, poultry, dairy, natural resources, and environmental management. VCE has published several publications that deal specifically with TMDLs. For more information on these publications and to find the location of county extension offices, visit www.ext.vt.edu.

VOF: The Virginia Outdoors Foundation was established in 1966 "to promote the preservation of open-space lands and to encourage private gifts of money, securities, land or other property to preserve the natural, scenic, historic, scientific, open-space and recreational areas of the Commonwealth." The primary mechanism for accomplishing VOF's mission is through open-space easements. Open-space easements allow land to continue to be privately owned but restricted to serve and protect land for the public good.

USEPA: The United States Environmental Protection Agency has the responsibility of overseeing the various programs necessary for the success of the CWA. However, administration and enforcement of such programs falls largely to the states. USEPA provides funding to implement TMDLs through Section 319 Incremental Funds.

NRCS: The Natural Resources Conservation Service is the federal agency that works hand-in-hand with the American people to conserve natural resources on private lands. NRCS assists private landowners with conserving their soil, water, and other natural resources. Local, state and federal agencies along with policymakers also rely on the expertise of NRCS staff. NRCS is a major funding stakeholder for impaired water bodies through the CREP and EQIP programs.

INTEGRATION WITH OTHER WATERSHED PLANS

Each watershed within the state is under the jurisdiction of a multitude of individual yet related water quality programs and activities, many of which have specific geographical boundaries and goals. These include but are not limited to Watershed Implementation Plans, TMDLs, Roundtables, Water Quality Management Plans, Erosion and Sediment Control Regulations, Stormwater Management Program, Source Water Assessment Program, and local comprehensive plans. The progress of these planning efforts needs continuous evaluation to determine possible effects on implementation goals. Coordination of local programs can increase participation in implementation activities and prevent redundancy. Several planned initiatives coinciding with TMDL implementation in this watershed include:

- Updates to Patrick and Henry Counties Comprehensive Plans
- Update to City of Martinsville Comprehensive Plan
- Dan River Basin Association Eden Watershed Assessment – an IP-like study on a small watershed in the North Carolina portion of the Smith River watershed
- Martinsville-Henry County Rivers and Trails Recreational Use Plan
- Henry County PSA Philpott Reservoir Source Water Protection Plan
- VADCR Mayo River State Park Endangered Species Study
- Trout Unlimited Strategic Plan

The implementation actions proposed in this plan will enhance these community improvement initiatives by improving water quality and making the river more attractive to visitors for tourism and recreational activities. Combined, these efforts can contribute to improvements in the area economy and residents' quality of life.

POTENTIAL FUNDING SOURCES

Potential funding sources available during implementation were identified in the course of plan development. An approved Watershed Implementation Plan makes these watersheds eligible for competitively awarded TMDL Implementation grants currently awarded through VADCR. The VADCR has provided Patrick Soil and Water Conservation District with Livestock Exclusion Initiative funds to promote livestock exclusion practices in the implementation plan area between July 2012 and June 2014.

Detailed description of each funding source (*i.e.*, eligibility requirements, specifications, incentive payments) can be obtained from the BRSWCD, PSWCD, WPPDC, VADCR, VDH, VADEQ, VADGIF, VCE, VOF, and NRCS. Table 24 illustrates various financial opportunities that exist from selected cost-share programs for agricultural and residential implementation needs. Sources include:

Federal Funding Sources

Federal Clean Water Act Section 319 Incremental Funds

USEPA develops guidelines that describe the process and criteria to be used to award CWA Section 319 NPS grants to states. States may use up to 20% of the Section 319 incremental funds to develop NPS TMDLs as well as to develop watershed-based plans for Section 303(d) listed waters. The balance of funding can be used for implementing watershed-based plans for waters that have completed TMDLs. Implementation of both agricultural and residential BMPs is eligible. VADCR administers the money, in coordination with the Nonpoint Source Advisory Committee (NPSAC), to fund watershed projects, demonstration and educational programs, nonpoint source pollution control program development, and technical and program staff. VADCR reports annually to the USEPA on the progress made in nonpoint source pollution prevention and control. <http://www.epa.gov/owow/nps/319/319stateguide-revised.pdf>

USDA Conservation Reserve Enhancement Program (CREP)

In Virginia, this is a partnership program between the USDA and the Commonwealth of Virginia, with the VADCR being the lead state agency. The program uses financial incentives to encourage farmers to enroll in contracts of 10 to 15 years or perpetual easements to remove lands from agricultural production. This program is an "enhancement" of the existing USDA CRP Continuous Sign-up. It has been "enhanced" by increasing the cost-share rates from 50% to 75% and 100%, increasing the rental rates, and offering a flat rate incentive payment to place a permanent "riparian easement" on the enrolled area. Pasture and cropland (as defined by USDA) adjacent to streams, intermittent streams, seeps, springs, ponds and sinkholes are eligible to be enrolled. Buffers consisting of native, warm-season grasses on cropland, to mixed hardwood trees on pasture, must be established in widths ranging from the minimum of 30% of the floodplain or 35 feet, whichever is greater, to a maximum average of 300 feet. Cost-sharing (75% - 100%) is available to help pay for fencing to exclude livestock from the riparian buffer, watering facilities, hardwood tree planting, filter strip establishment, and wetland restoration. In addition, a 40% incentive payment upon completion is offered and an average rental rate of \$70/acre on

stream buffer area for 10-15 years. The State of Virginia will make an additional incentive payment to place a perpetual conservation easement on the enrolled area. The statewide goal is 8,000 acres. The landowner can obtain and complete CREP application forms at the FSA center. The forms are forwarded to local NRCS and SWCD offices while FSA determines land eligibility. If the land is deemed eligible, NRCS and the local SWCD determine and design appropriate conservation practices. A conservation plan is written, and fieldwork is begun, which completes the conservation practice design phase. FSA then measures CREP acreage, conservation practice contracts are written, and practices are installed. The landowner submits bills for cost-share reimbursement to FSA. Once the landowner completes BMP installation and the practice is approved, FSA and the SWCD make the cost-share payments. The SWCD also pays out the state's one-time, lump sum rental payment. FSA conducts random spot checks throughout the life of the contract, and the agency continues to pay annual rent throughout the contract period. http://www.dcr.virginia.gov/soil_&_water/crep.shtml

USDA Conservation Reserve Program (CRP)

The program offers annual rental payments, incentive payments for certain activities, and cost-share assistance to establish approved cover on cropland. Contract duration is between 10 and 15 years, and cost-share assistance is provided up to 50% of costs. Incentive payments for wetlands hydrology restoration equal 25% of the cost of restoration. Offers are accepted and processed during fixed signup periods that are announced by Farm Service Agency (FSA). All eligible (cropland) offers are ranked using a national ranking process. Payments are based on a per-acre soil rental rate. Cost-share assistance is available to establish the conservation cover of tree or herbaceous vegetation. The per-acre rental rate may not exceed the Commodity Credit Corporation's maximum payment amount, but producers may elect to receive an amount less than the maximum payment rate, which can increase the ranking score. To be eligible for consideration, the following criteria must be met: 1) cropland was planted or considered planted in an agricultural commodity two of the five most recent crop years; and 2) cropland is classified as "highly-erodible" by NRCS. Eligible practices include planting these areas to trees and/or herbaceous vegetation. Application evaluation points can be increased if certain tree species, spacing, and seeding mixtures that maximize wildlife habitats are selected. Land must have been owned or operated by the applicant for at least 12 months prior to the close of the signup period.

<http://www.nrcs.usda.gov/programs/crp/>

USDA Environmental Quality Incentives Program (EQIP)

This program was established in the 1996 Farm Bill to provide a single voluntary conservation program for farmers and landowners to address significant natural resource needs and objectives. Approximately 65% of the EQIP funding for the state of Virginia is directed toward "Priority Areas." These areas are selected from proposals submitted by a locally led conservation work group. Proposals describe serious and critical environmental needs and concerns of an area or watershed, and the corrective actions they desire to take to address these needs and concerns. The remaining 35% of the funds are directed toward statewide priority concerns of environmental needs. The purposes of the program are achieved through the implementation of an EQIP plan of operation, which includes structural and land management practices on eligible lands. Contracts up to ten years are written with eligible producers.

Cost-share of 75%, 25% tax credit, and/or incentive payments are made available to implement one or more eligible conservation practices, such as animal waste management facilities, terraces, filter strips, tree planting, and permanent wildlife habitat. Incentive payments can be made to implement one or more management practices, such as nutrient management, pest management, and grazing land management. <http://www.nrcs.usda.gov/programs/eqip/>

USDA Wetland Reserve Program (WRP)

The program provides an opportunity for landowners to receive financial incentives to enhance wetlands in exchange for retiring marginal lands from agriculture. The program benefits include providing fish and wildlife habitat, improving water quality, reducing flooding, recharging groundwater, protecting and improving biological diversity, and furnishing recreational and esthetic benefits. The program offers three enrollment options: permanent easements, 30-year easement, and restoration cost-share agreement (10-year agreement where USDA pays 75% of the restoration costs). Under the permanent easement option, landowners may receive the agricultural value of the land up to a maximum cap and 100% of the cost of restoring the land. For the 30-year option, a landowner will receive 75% of the easement value and 75% cost-share on the restoration. A ten-year agreement is also available that pays 75% of the restoration cost. To be eligible for WRP, land must be suitable for restoration (formerly wetland and drained) or connect to adjacent wetlands. A landowner continues to control access to the land and may lease the land for hunting, fishing, or other undeveloped recreational activities. At any time, a landowner may request that additional activities be added as compatible uses. Land eligibility is dependent on length of ownership, whether the site has been degraded as a result of agriculture, and the land's ability to be restored. Restoration agreement participants must show proof of ownership. Easement participants must have owned the land for at least one year and be able to provide clear title. <http://www.nrcs.usda.gov/programs/wrp/>

USDA Wildlife Habitat Incentive Program (WHIP)

WHIP is a voluntary program for landowners and land users who want to develop or improve wildlife habitat on private agriculture-related lands. USDA and the participant enter into a five to ten year cost-share agreement for wildlife habitat development. In Virginia, high priority habitat needs include: early grassland habitats that are home to game species such as quail and rabbit, as well as other non-game species like meadowlark and sparrows; riparian zones along streams and rivers that provide benefits to aquatic life and terrestrial species; migration corridors which provide nesting and cover habitats for migrating songbirds, waterfowl and shorebird species; and decreasing natural habitat systems which are environmentally sensitive and have been impacted and reduced through human activities. Cost-share up to 75% is available for the cost of installing practices. Applicants will be competitively ranked within the state and certain areas and practices will receive higher ranking based on their value to wildlife. Types of practices include: disking, prescribed burning, mowing, planting habitat, converting fescue to warm season grasses, establishing riparian buffers, creating habitat for waterfowl, and installing filter strips, field borders and hedgerows. <http://www.nrcs.usda.gov/programs/whip/>

U.S. Fish and Wildlife Service Conservation Grants

Funds states to implement conservation projects to protect federally listed threatened or endangered species and species at risk. <http://www.fws.gov/grants/state.html>

U.S. Fish and Wildlife Service Private Stewardship Program

Funds individuals or groups engaged in local, private, and voluntary conservation efforts to benefit federally listed, proposed, or candidate species, or other at risk species.

http://www.fws.gov/endangered/grants/private_stewardship/index.html

Virginia Funding Sources

Virginia Agricultural Best Management Practices Cost-Share Program

The Program is administered by VADCR to improve water quality in the state's streams, rivers and the Chesapeake Bay. The basis of the program is to encourage the voluntary installation of agricultural best management practices to meet Virginia's NPS pollution water quality objectives. This program is funded by the state Water Quality Improvement Fund (WQIF) and the federal Chesapeake Bay Program Implementation Grant monies through local Soil and Water Conservation Districts (SWCDs). Farmers and landowners are encouraged to use BMPs on their land to better control sediment, nutrient loss, and transportation of pollutants into our waters due to excessive surface flow, erosion, leaching, and inadequate animal waste management. Program participants are recruited by SWCDs based upon those factors, which have a great impact on water quality. The objective is to solve water quality problems by fixing the worst problems first. Cost-share is typically 75% of the actual cost, not to exceed the local maximum. Each practice under the cost-share program has specifications and a lifetime during which the practice must be maintained. <http://www.dcr.virginia.gov/sw/costshar.htm>.

Virginia Agricultural Best Management Practices Tax Credit Program

The program provides a tax credit for approved agricultural BMPs that are installed to improve water quality in accordance with a conservation plan approved by the local SWCD. The goal of this program is to encourage voluntary installation of BMPs that will address Virginia's NPS pollution water quality objectives. For all taxable years, any individual or corporation engaged in agricultural production for market, who has in place a soil conservation plan approved by the local SWCD, shall be allowed a credit against the tax imposed by Section 58.1-320 of an amount equaling 25% of the first \$70,000 expended for agricultural best management practices by the individual. "Agricultural best management practices" are approved measures that will provide a significant improvement to water quality in the state's streams and rivers, and is consistent with other state and federal programs that address agricultural nonpoint source pollution management. Any practice approved by the local SWCD Board shall be completed within the taxable year in which the credit is claimed. The credit shall be allowed only for expenditures made by the taxpayer from funds of his/her own sources. The amount of such credit shall not exceed \$17,500 or the total amount of the tax imposed by this program, whichever is less, in the year the project was completed, as certified by the Board. If the amount of the credit exceeds the taxpayer's liability for such taxable year, the excess may be carried over for credit against income taxes in the next five taxable years until the total amount of the tax credit has been taken. This program can

be used independently or in conjunction with other cost-share programs on the stake holder's portion of BMP costs. It is also approved for use in supplementing the cost of repairs to streamside fencing. <http://www.dcr.virginia.gov/sw/costshar.htm>.

Virginia Water Quality Improvement Fund

This is a permanent, non-reverting fund established by the Commonwealth of Virginia in order to assist local stakeholders in reducing point and nonpoint nutrient loads to surface waters. Eligible organizations include local governments, SWCDs, and individuals. Grants for point sources are administered through VADEQ and grants for nonpoint sources are administered through VADCR. Most WQIF grants provide matching funds on a 50/50 cost-share basis. A request for proposals is distributed annually. Successful applications are listed as draft/public-noticed agreements, and are subjected to a public review period of at least 30 days. Information is available at <http://www.dcr.virginia.gov/sw/wqia.htm>.

Virginia Forest Stewardship Program

The program is administered by the VADOF to protect soil, water, and wildlife and to provide sustainable forest products and recreation. www.dof.virginia.gov/forms/resources/127.doc

Virginia Small Business Environmental Compliance Assistance Fund

The program provides financial assistance to small businesses by providing loans to small businesses for the purchase and installation of environmental pollution control equipment, equipment to implement voluntary pollution prevention measures, or equipment and structures to implement agricultural BMPs certified as eligible by VADCR. Interest rates are fixed at 3%, and the maximum loan available is \$100,000. There is a \$30 non-refundable application processing fee. The program will not be used to make loans to small businesses for the purchase and installation of equipment needed to comply with an enforcement action. To be eligible for assistance, a business must employ 100 or fewer people and be classified as a small business under the federal Small Business Act.

<http://www.dba.state.va.us/financing/programs/small.asp>

Virginia Clean Water Revolving Loan Programs

The Virginia Clean Water Revolving Loan Fund (VCWRLF), previously known as the Virginia Revolving Loan Fund, was created in 1987. The Department of Environmental Quality, on behalf of the State Water Control Board (SWCB), manages the VCWRLF, administering the policy aspects of the Fund, receiving applications and providing funding recommendations to the SWCB. The Virginia Resources Authority (VRA) serves as the financial manager of the Fund. Initially, the VCWRLF included a single program which was established to provide financial assistance in the form of low-interest loans to local governments for needed improvements at publicly-owned wastewater treatment facilities and/or collection systems. In 1999, 2001 and 2003 the scope of VCWRLF activity was expanded by the State Water Control Board and DEQ implemented additional programs to provide low interest loans related to agricultural and other non-point source water quality issues. The following loan programs are now operated within the Virginia Clean Water Revolving Loan Fund. <http://www.deq.state.va.us/cap/wwovrview.html>

Virginia Outdoors Foundation

The Virginia Outdoors Foundation was established in 1966, "to promote the preservation of open-space lands and to encourage private gifts of money, securities, land or other property to preserve the natural, scenic, historic, scientific, open-space and recreational areas of the Commonwealth." The primary mechanism for accomplishing VOF's mission is through open-space easements. Open-space easements allow land to continue to be privately owned but restricted to serve and protect land for the public good. Conservation incentives include the Purchase of Development Rights program, tax credits that can be sold to any Virginia tax payer, and 100% reimbursement for legal, accounting, appraisal fees, etc.

Regional Funding Sources

National Fish and Wildlife Foundation

Private, non-profit 501c(3) tax-exempt organization that fosters cooperative partnerships to conserve wildlife, plants, and the habitats on which they depend. A General Challenge Grants Program and a Special Grants Program are offered. Grants are available to federal, state, and local governments, educational institutions, and non-profit organizations through General Challenge Grants. Of particular interest are the Chesapeake Bay Small Watershed Grants Program, Innovative Nutrient and Sediment Reduction Program, and Chesapeake Targeted Watershed Grants Program. Offers are accepted throughout the year and processed during fixed signup periods. The signup periods are on a year-round, revolving basis, and there are two decision cycles per year. Each cycle consists of a pre-proposal evaluation, full proposal evaluation, and a Board of Directors decision. An approved pre-proposal is a pre-requisite to the submittal of the full proposal. Grants generally range between \$10,000 and \$150,000. Payments are based on need. Projects are funded in the U.S., and any international areas that host migratory wildlife from the U.S., marine animals, or endangered species. Grants are awarded for the purpose of conserving fish, wildlife, plants, and their habitats. If the project does not fall into the criteria of any special grant programs, the proposal may be submitted as a general grant if it falls under the following guidelines: 1) it promotes fish, wildlife and habitat conservation, 2) it involves other conservation and community interests, 3) leverages available funding, and 4) evaluates project outcomes. A pre-proposal that is not accepted by a special grant program may be deferred to the general grant program. http://www.nfwf.org/programs/grant_apply.htm

Southeast Rural Community Assistance Project (Southeast RCAP)

The mission of this project is to promote, cultivate, and encourage the development of water and wastewater facilities to serve low-income residents at affordable costs and to support other development activities that will improve the quality of life in rural areas. Staff members of other community organizations complement the Southeast RCAP central office staff across the region. They can provide (at no cost to a community): on-site technical assistance and consultation, operation and maintenance/management assistance, training, education, facilitation, volunteers, and financial assistance. Financial assistance includes \$1,500 toward repair/replacement/installation of a septic system and \$2,000 toward repair/replacement/installation of an alternative waste treatment system.

Funding is only available for families making less than 125% of the federal poverty level. The federal poverty threshold for a family of four is \$18,850. <http://www.sercap.org>

Community Development Block Grant Program (HUD/CDBG)

The Community Development Block Grant (CDBG) program is a flexible program that provides communities with resources to address a wide range of unique community development needs. Beginning in 1974, the CDBG program is one of the longest continuously run programs at HUD. The CDBG program provides annual grants on a formula basis to 1180 general units of local government and States. <http://www.hud.gov/offices/cpd/communitydevelopment/programs/>

STEP, Inc. (Support to Eliminate Poverty)

STEP, Inc., formerly known as The Franklin County Community Action Program, is a dynamic Community Action Agency serving Franklin, Patrick, Pittsylvania and Henry Counties and the cities of Martinsville and Danville. Since 1966, STEP, Inc. has been on the forefront of providing effective programs designed to help low-income individuals and families overcome poverty. Their mission is to provide exceptional services to families seeking to improve their quality of life through community, economic, personal and family development.

Pittsylvania County Community Action Agency

PCCA has become a multi-jurisdiction agency. This agency is the designated Community Action for Pittsylvania County, the City of Danville, the City of Martinsville, and Henry County. The PCCA provides for no interest loans to low-income homeowners whose dwellings lack functional indoor plumbing, assists low-income clients with indoor water, and assists eligible clients with emergency home repairs.

Dan River Basin Association

DRBA works to: preserve the river corridor with a series of municipal, county, and state parks and trails; increase public access to rivers; build constituency for the rivers and outdoor recreation through monthly outings; protect water quality by instituting stream monitoring across the Basin; promote regional nature and heritage tourism; and bridge boundaries to create a bi-state borderland community.

Trout Unlimited

A non-profit organization dedicated to the conservation of freshwater streams, rivers, and associated upland habitats for trout, salmon, other aquatic species, and people. Local chapter activities typically include stream restoration, education programs such as "Trout in the Classroom," and group activities. Stream restoration can include such things as removal of encroaching species of plant from stream banks, construction of retaining walls to prevent river erosion due to human use, and construction of weirs or small water breaks to provide trout habitat where none existed before.

Table 24. Control measures with estimated cost-share program and landowner costs.

Control Measure	Program Code	Unit	Cost-share	Average Cost/Unit to State or Federal Program (\$)	Average Cost/Unit to Landowner (\$)¹
Livestock exclusion with 35 ft or greater buffer	CREP	System	90% + varied incentive	24,300	2,700
Livestock exclusion with 35 ft or greater buffer	EQIP	System	75%	18,750	6,250
Livestock exclusion with 35 ft or greater buffer	LE-1T	System	85%	21,250	3,750
Small Acreage Grazing System with 35 ft setback	SL-6AT	System	50%	4,500	4,500
Livestock exclusion with 10 ft setback	LE-2T	System	50%	8,500	8,500
Stream Protection	WP-2T	System	75% + \$0.50/ft incentive	4,350	650
Pasture and Hayland Re-planting	512	Acres	\$165/ac	165	130
Prescribed grazing	528	Acres	\$30/ac	30	40
Permanent vegetative cover on cropland	SL-1	Acres	75% + \$35/ac incentive	260	40
Reforestation of erodible crop and pastureland	FR-1	Acres	up to \$300/ac	300	150
Manure / biosolids soil incorporation	N/A	Acres	N/A	0	25
Dry Manure Storage Facility	WP-4	System	75%	56,250	18,750
Septic Tank Pump-out	RB-1	System	50%	125	125
Connection of OSDS to Public Sewer	RB-2	System	50% - 75%	3,000 – 4,500	1,500 - 3,000
Septic Tank System Repair	RB-3	System	50% - 75%	1,500 – 2,250	750 - 1,500
Septic Tank System Installation / Replacement	RB-4	System	50% - 75%	3,000 – 4,500	1,500 - 3,000
Septic Tank System Installation / Replacement w/ Pump	RB-4P	System	50% - 75%	4,000 – 6,000	2,000 - 4,000
Alternative On-site Waste Treatment System	RB-5	System	50% - 75%	7,500 – 11,250	3,750 - 7,500
Pet waste education program	N/A	Program	N/A	0	5,000
Pet waste digesters	N/A	System	N/A	0	50
Confined Canine Unit Waste Treatment System	N/A	System	N/A	0	20,000
Vegetated Buffers	N/A	Acres²	N/A	0	400
Bioretention	N/A	Acres³	N/A	0	15,000
Infiltration Trench	N/A	Acres³	N/A	0	11,300

¹ Does not include tax credit or in-kind service; ² Acres treated; ³ Acres installed

LIST OF ACRONYMS

AWG	Agricultural Working Group
BMP	Best Management Practice
BRES	Blue Ridge Environmental Solutions, Inc.
BRSWCD	Blue Ridge Soil and Water Conservation District
CCU	Confined Canine Unit
CREP	Conservation Reserve and Enhancement Program
CRP	Conservation Reserve Program
CWA	Clean Water Act
EQIP	Environmental Quality Incentive Program
FR-1	Reforestation of Erodible Crop and Pastureland
FSA	Farm Service Agency
FTE	Full Time Equivalent
GWG	Government Working Group
HOA	Homeowners Association
IP	Implementation Plan
LE-1T	Livestock Exclusion with Riparian Buffers
LE-2T	Livestock Exclusion with Reduced Setback
LID	Low Impact Development
NFWF	National Fish and Wildlife Foundation
NPS	Nonpoint Source
NRCS	Natural Resources Conservation Service
NWBD	National Watershed Boundary Dataset
OSDS	On-Site Sewage Disposal System
PSWCD	Patrick Soil and Water Conservation District
RB-1	Septic System Pump-Out
RB-2	Connection of Malfunctioning OSDS or Straight Pipe to Public Sewer
RB-3	Septic Tank System Repair
RB-4	Septic Tank Installation / Replacement
RB-5	Alternative On-Site Waste Treatment System
RUWG	Residential / Urban Working Group
SL-1	Permanent Vegetative Cover on Cropland
SL-6AT	Small Acreage Grazing System
SWCB	State Water Control Board
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
VADACS	Virginia Department of Agriculture and Consumer Services
VADCR	Virginia Department of Conservation and Recreation
VADEQ	Virginia Department of Environmental Quality
VADOF	Virginia Department of Forestry
VCE	Virginia Cooperative Extension
VDGIF	Virginia Department of Game and Inland Fisheries
VDH	Virginia Department of Health
VOF	Virginia Outdoors Foundation

WP-2T	Stream Protection
WPPDC	West Piedmont Planning District Commission
WQIF	Water Quality Improvement Fund
WQMIRA	Water Quality Monitoring, Information and Restoration Act
WHIP	Wildlife Habitat Incentive Program
WRP	Wetland Reserve Program

GLOSSARY

303(d) List - is short for the list of impaired and threatened waters (stream/river segments, lakes) that the Clean Water Act requires all states to submit for USEPA approval every two years on even-numbered years.

Anthropogenic - involving the impact of humans on nature; specifically items or actions induced, caused, or altered by the presence and activities of humans.

Assimilative Capacity - a measure of the ability of a natural body of water to effectively degrade and/or disperse chemical substances. Assimilative capacity is used to define the ability of a waterbody to naturally assimilate a substance without impairing water quality or degrading the aquatic ecosystem. Numerically, it is the amount of pollutant that can be discharged to a specific waterbody without exceeding water quality standards.

Benthic – refers to material, especially sediment, at the bottom of a waterbody. It can be used to describe the organisms that live on, or in, the bottom of a waterbody.

Best Management Practices (BMPs) - reasonable and cost-effective means to reduce the likelihood of pollutants entering a water body. BMPs include riparian buffer strips, filter strips, nutrient management plans, conservation tillage, etc.

Cost-share Program - a program that allocates funds to pay a percentage of the cost of constructing or implementing a BMP. The remaining costs are paid by the producer(s).

Delisting - the process by which an impaired waterbody is removed from the Section 303(d) Impaired Waters List. To remove a waterbody from the Section 303(d) list, the state must demonstrate to USEPA, using monitoring or other data, that the waterbody is attaining the water quality standard.

E. coli - type of bacteria found in the feces of various warm-blooded animals that is used as an indicator of the possible presence of pathogenic (disease causing) organisms.

Erosion - detachment and transport of soil particles by water and wind. Sediment resulting from soil erosion represents the single largest source of nonpoint source pollution in the United States.

Failing septic system - septic systems in which drain fields have failed such that effluent (wastewater) that is supposed to percolate into the soil, now rises to the surface and ponds on the surface where it can flow over the soil surface to streams or contribute pollutants to the surface where they can be lost during storm runoff events.

Fecal coliform - A type of bacteria found in the feces of various warm-blooded animals that is used as an indicator of the possible presence of pathogenic (disease causing) organisms.

Full Time Equivalent (FTE) - Is a way to estimate staff needed for a project. A FTE of 1.0 means that the position is equivalent to a full-time worker, while a FTE of 0.5 indicates a part-time worker.

Geographic Information System (GIS) - a system of hardware, software, data, people, organizations and institutional arrangements for collecting, storing, analyzing and disseminating information about areas of the earth. An example of a GIS is the use of spatial data for Emergency Services response (E-911). Dispatchers use GIS to locate the caller's house, identify the closest responder, and even determine the shortest route. All these activities are automated using the electronic spatial data in the GIS.

HSPF (Hydrological Simulation Program-Fortran) - A computer-based model that calculates runoff, sediment yield, and fate and transport of various pollutants to the stream. The model was developed under the direction of the U.S. Environmental Protection Agency (EPA).

Impaired waters - those waters with chronic or recurring monitored violations of the applicable numeric and/or narrative water quality standards.

Instantaneous criterion - the instantaneous criterion or instantaneous water quality standard is the value of the water quality standard that should not be exceeded at any time. For example, the Virginia instantaneous water quality standard for E.coli is 235 cfu/100 mL. If this value is exceeded at any time, the water body is in exceedance of the state water quality standard.

Load allocation (LA) - portion of the loading capacity attributed to 1) the existing or future nonpoint sources of pollution, and 2) natural background sources. Wherever possible, nonpoint source loads and natural loads should be distinguished.

Margin of safety (MOS) - a required component of the TMDL that accounts for the uncertainty in calculations of pollutant loading from point, nonpoint, and background sources.

Modeling - a system of mathematical expressions that describe both hydrologic and water quality processes. When used for the development of TMDLs, models can estimate the load of a specific pollutant to a waterbody and make predictions about how the load would change as remediation steps are implemented.

Monitoring - periodic or continuous sampling and measurement to determine the physical, chemical, and biological status of a particular medium like air, soil, or water.

Nonpoint source pollution - pollution originating from multiple sources on and above the land. Examples include runoff from fields, stormwater runoff from urban landscapes, roadbed erosion in forestry, and atmospheric deposition.

Nutrient - any substance assimilated by living things that promotes growth. The term is generally applied to nitrogen and phosphorus in wastewater, but is also applied to other essential and trace elements.

Pathogen - Disease-causing agent, especially microorganisms such as certain bacteria, protozoa, and viruses.

Point source pollution - pollutant loads discharged at a specific location from pipes, outfalls, and conveyance channels from either municipal wastewater treatment plants or industrial treatment facilities or any conveyance such as a ditch, tunnel, conduit or pipe from which pollutants are discharged. Point sources have a single point of entry with a direct path to a water body. Point sources can also include pollutant loads contributed by tributaries to the main receiving stream or river.

Riparian - pertaining to the banks of a river, stream, pond, lake, etc., as well as to the plant and animal communities along such bodies of water

Runoff - that part of precipitation, snowmelt, or irrigation water that does not infiltrate but flows over the land surface, eventually making its way to a stream, river, lake or an ocean. It can carry pollutants from the land and air into receiving waters.

Sediment - in the context of water quality, soil particles, sand, and minerals dislodged from the land and deposited into aquatic systems as a result of erosion.

Septic system - an on-site system designed to treat and dispose of domestic sewage. A typical septic system consists of a tank that receives liquid and solid wastes from a residence or business and a drainfield or subsurface absorption system consisting of a series of tile or percolation lines for disposal of the liquid effluent. Solids (sludge) that remain after decomposition by bacteria in the tank must be pumped out periodically.

Simulation - The use of mathematical models to approximate the observed behavior of a natural water system in response to a specific known set of input and forcing conditions. Models that have been validated, or verified, are then used to predict the response of a natural water system to changes in the input or forcing conditions.

Stakeholder - any person or organization with a vested interest in development and implementation of a local watershed water quality implementation plan (e.g., farmer, landowner, resident, business owner, or government official)

Straight pipe - delivers wastewater directly from a building, e.g., house or milking parlor, to a stream, pond, lake, or river.

Total Maximum Daily Load (TMDL) - a pollution "budget" that is used to determine the maximum amount of pollution a waterbody can assimilate without violating water quality standards. The TMDL includes waste load allocations (WLAs) for permitted point sources, load allocations (LAs) for nonpoint and natural background sources, plus a Margin of Safety (MOS). A TMDL is developed for a specific pollutant and can be expressed in terms of mass per time, toxicity, or other appropriate measures that relate to a state's water quality standard.

Wasteload allocation (WLA) - the portion of a receiving water's loading capacity that is allocated to one of its existing or future permitted point sources of pollution. WLAs constitute a type of water quality-based effluent limitation.

Water quality - the biological, chemical, and physical conditions of a waterbody. It is a measure of a waterbody's ability to support beneficial uses.

Water quality standards - a group of statements that constitute a regulation describing specific water quality requirements.

Watershed - area that drains to, or contributes water to, a particular point, stream, river, lake or ocean. Larger watersheds are also referred to as basins. Watersheds range in size from a few acres for a small stream, to large areas of the country like the Chesapeake Bay Basin that includes parts of six states.

APPENDIX A

Agricultural & Residential/Urban Working Groups Meeting Notes

Agricultural & Residential/Urban Working Groups
October 16, 2012 Meeting Summary
Horsepasture District Volunteer Fire Department; Ridgeway, VA

Meeting Attendees

Bob Gordon, Citizen
Michael Ward, Henry County PSA
Aaron Burdick, West Piedmont Planning District Commission
Joe Bonanno, West Piedmont Planning District Commission
Anna Wallace, Dan River Basin Association
Jack M. Hodges, Blue Ridge Soil and Water Conservation District
Tony Collins, Patrick Soil and Water Conservation District
Virginia H. Mills, Citizen
S.M. Hairston, Citizen
T. Kem Pace, VA Department of Forestry
Craig “Rocky” Rockwell, US Army Corps of Engineers
Jeff Turner, Patrick County Health Department
Bobby Cobler, Landowner
Laura Cobler, Landowner
Darrin Doss, VA Department of Health
Brad Carter, VA Department of Health
Debra Parsons Buchanan, Henry County Board of Supervisors, Horsepasture District
Charles E. Williams, Citizen
Bill Winn, Citizen
Barb Winn, Citizen
Wayne Kirkpatrick, Citizen
Kevin Keith, VA Department of Forestry
Clyde Holland, Landowner
Darryl Holland, Landowner
Ron Morris, WZBB Radio
Rick Meadows, Landowner
T.V. Marshall, Citizen
Marie Marshall, Citizen
Cy Stober, Piedmont Triad Regional Council
Mary Dail, VA Department of Environmental Quality
Stacy Horton, VA Department of Conservation and Recreation
Byron Petrauskas, Blue Ridge Environmental Solutions, Inc.
Heather Vereb, VA Department of Conservation and Recreation

Welcome and Introduction

- Heather Vereb welcomed attendees and thanked them for attending the meeting.

Agricultural Working Group Discussion Points

Local Agriculture

- Locally, agricultural production is changing based on land use conversion such as cropland to pasture, cropland and/or pasture to forests, etc.
 - Primarily beef and horses; one dairy
 - Some cropland
 - One dairy in Patrick County has gone out of business
 - Very little tobacco being raised anymore
 - Land has either been converted to trees or to pasture for beef cattle
 - Goat production has increased in the past five years.
 - One buffalo farm in Stuart - animals have been excluded from stream
 - One hog operation in Patrick County with 15 to 20 sows
 - 2 feedlots in Patrick County
- Most folks farm part time rather than full time because it's hard to make a living on the farm anymore, especially now that tobacco is mostly gone. Full time farming is estimated at less than 30% of farms.
- The number of horses in the area is increasing. Horses could be an increasing source problem; however, most farms with horses have adequate acreage in Patrick and Henry Counties.
- There are no sheep in Henry County with the exception of "zoos". Sheep operations in Patrick County are very small.

Agricultural BMP Cost-share

- Three of the AWG participants are farmers; one works with timber (was a former beef farmer).
- All producers present have participated in state or federal BMP cost-share programs.
- Voluntary BMPs were installed by AWG participants.
 - Voluntary BMPs, particularly those that meet specifications, are virtually non-existent in Patrick County.
 - Fence is the most common voluntary BMP because there no restrictions when implemented as a voluntary BMP. Troughs and wells are dependent upon cost-share.
- It is estimated 50 to 70% of local producers have implemented stream fencing within the two counties.
 - Several AWG participants felt that runoff contributed most to the loading in streams rather than direct deposition.
- Participants felt that the major barriers to fencing include: buffer requirements and giving up too much land, flooding and fence maintenance, cost, government programs, and the traditional culture.
 - Participation depends on the area. Many people don't want to work with the government.

- It's hard for many participants to pay for practices up front. The low interest loan option was mentioned as a possible solution. Producers may also lower cost of implementation by using their own labor to install practices where possible (an "in kind option"). 100% cost-share could be helpful in reaching more difficult clients. However, the consensus was that even with 100% incentive payment on practices that some folks still wouldn't participate because they don't want to work with the government.
- Power line access makes it difficult in a few situations. Some producers have tried solar pumps but have found that they need to be replaced about every two years.
- Because of hilly terrain, some don't want to give up 35 feet for a buffer area because the "best", flat farmland is in river bottoms. Buffer fencing takes a lot of pastureland away from production. Virginia has recognized this issue and has offered a solution of a ten-foot setback practice (LE-2)
- People are proud and don't want to take cost-share.
- Fence replacement costs can be prohibitive if fence is destroyed due to flooding.
- One AWG participant mentioned that cattle prefer clean water over that of streams when given an option and questioned whether exclusion fence was even needed.
- Portable shade structures are not common.
- There are many absentee landowners in Patrick and Henry Counties. Lessees don't want to commit to lifespan requirements of the BMP program.
- Popular cost share programs include the federal programs Conservation Reserve Enhancement Program (CREP), Conservation Reserve Program (CRP), and Environmental Quality Incentives Program (EQIP).
 - Within the last ten years, there has been a great deal of CREP and Virginia Agricultural Cost Share (VACS) implementation.
 - Probably about \$750,000 has been spent in CREP funding within the last ten years.
 - GWG participants suggested that CREP eligibility should be expanded to all watersheds in Patrick and Henry Counties.
 - Between 2002 and 2007, approximately \$500,000 of EQIP funds was spent in the South Mayo watershed.

Manure and Biosolids

- Manure is spread on local crop fields.
- One farm in Patrick County spreads biosolids.
- There are no poultry operations in the area.
 - Poultry litter is imported into Henry County from North Carolina and from the Valley in Virginia.
 - Poultry litter is imported into Patrick County from North Carolina. There is very little poultry litter imported into Patrick County.
- One dairy in the watershed may need additional waste storage for manure.
- One AWG participant mentioned that producers often voluntarily move feedlots away from streams in order to avoid the issue of mud.
- There are two sizeable feedlots in Patrick County with a number of stockers. However, these feedlots are not large enough to be considered confined animal feeding operations.

Funding and Technical Assistance

- It was recommended that the following organizations be involved in the development of the implementation plan: Farm Bureau, Patrick Cattlemen’s Association (George Stovall), Ferrum College, and Dan River Basin Association.
- Working group participants suggested that the Dan River Basin Association and Trout Unlimited may be able to help fund agricultural practices in the watershed.
- A question was raised about the Park Service leasing farmed land along the Blue Ridge Parkway. It was noted that Park Service land is not located in the TMDL area.

Additional Thoughts

- Geese are a nuisance in the watershed. Geese and other wildlife, including beavers, muskrats, and otters likely contribute to bacterial pollution.
 - The implementation plan will take into account bacterial loads from wildlife, as modeled in the TMDL.

Residential/Urban Working Group Discussion Points

Onsite Residential Waste Systems

- Residents in both counties seem to be intimidated by perceived financial costs and potential repercussions associated with approaching the Health Department to address onsite waste disposal issues.
- There is no septic tank pump-out ordinance in Patrick County, Henry County, or the City of Martinsville.
 - The RUWG participants suggested that most residents don’t practice regular maintenance of their systems and aren’t concerned with problems unless they have back-ups into their homes.
 - People may also hide problems because they don’t have the money to or don’t want to pay for repairs.
- RUWG participants felt strongly that cost share for pumpouts, repairs, and replacements would be very effective in encouraging people to come forward with problems.
- It was suggested that the Foley Mountain area off of Polebridge Road in the North Mayo watershed may have increased risk of failing septic systems and/or straight pipes, but that residents in that area may not be receptive to education/repair programs.
- There are several sewage lagoons in the watershed.
- There was a lagoon servicing several trailers off of Wells Hollow Road, but several participants thought those homes may have recently been connected to public sewer.

Pet Waste

- RUWG participants felt that many residents in the watershed would be annoyed by a pet waste pick-up campaign, and that it may deter residents from participating in the implementation plan.

- RUWG participants did not know that the City of Martinsville has a pet waste pick-up ordinance for public places.
- They suggested residents in uptown Martinsville may be more receptive to an educational campaign.
- The Health Department has not seen much success with waste treatment systems in local kennels and veterinary offices. The major problem is caused by fur, which clogs systems and does not break down easily

Stormwater BMPs

- RUWG participants were not aware of any stormwater BMPs in Henry County.
- The Patriot Centre Industrial Park in Martinsville has retention ponds to control runoff.
- In Patrick County, sedimentation ponds collect flow from public sewers in Stuart.

Financial and Technical Assistance

- RUWG participants felt that outreach and education could both be best achieved through announcements and articles in local newspapers (The Enterprise in Patrick County and Martinsville Bulletin) and distribution of flyers via companies offering septic tank pumpouts.
- Representatives from a local TV station (WGSR47) and radio station (WZBB) were present for the meeting and suggested they could assist with advertising, as well.
- Local agencies that may be able to assist with Residential/Urban education and funding include Support to Eliminate Poverty (STEP), Southeast Rural Community Assistance Project (SERCAP), Dan River Basin Association (DRBA), and the Harvest Foundation.

What's Next?

- The Government Working Group will meet in December
- The next Working Group meetings will take place in January. There will be separate meetings in Patrick and Henry Counties.

For More Information

- Heather Vereb, DCR (540) 394-2586, heather.vereb@dcr.virginia.gov.
- The TMDL studies for this implementation plan can be viewed at
<http://www.deq.virginia.gov/portals/0/DEQ/Water/TMDL/apptmdls/roankrvr/smayo.pdf>
<http://www.deq.virginia.gov/portals/0/DEQ/Water/TMDL/apptmdls/roankrvr/danec.pdf>

Agricultural & Residential/Urban Working Groups

January 29, 2013 Meeting Summary

Patrick Henry Community College; Stuart, VA

January 30, 2013 Meeting Summary

Henry County Administration Building; Collinsville, VA

Meeting Attendees

Tony Collins, Patrick Soil and Water Conservation District
Jeff Turner, VA Department of Health
Bob Gordon, Citizen
Cy Stober, Piedmont Triad Regional Council
Jonathan Wood, Citizen
Danny Wood, Citizen
Richard Kreh, Patrick Soil and Water Conservation District
Joe Bonanno, West Piedmont Planning District commission
Kevin Keith, VA Department of Forestry
Sandra Heath, Patrick Soil and Water Conservation District
John Wood, Patrick Soil and Water Conservation District
Teresa Roberson, Patrick County Farm Bureau
Kathy Smith, Blue Ridge Soil and Water Conservation District
Michael Tabor, Blue Ridge Soil and Water Conservation District
Perry W. Morgan, Blue Ridge Soil and Water Conservation District
Jack Hodges, Blue Ridge Soil and Water Conservation District
Dale Wagoner, Henry County
Cecil Stone, Henry County
Danny K. Robertson, Citizen
Wayne Kirkpatrick, Dan River Basin Association
Chad White, Citizen
Keith Jackson, Citizen
Mary Dail, VA Department of Environmental Quality
Drew Miller, VA Department of Environmental Quality
Byron Petrauskas, Blue Ridge Environmental Solutions, Inc.
Heather Vereb Longo, VA Department of Conservation and Recreation

Welcome and Introduction

- Heather Vereb Longo welcomed attendees and each person introduced himself or herself.

Public Participation Process

- Heather Vereb Longo briefly overviewed the TMDL Implementation Plan purpose and development process. She explained that this is the second meeting of the Residential and Agricultural Working Groups. The two groups previously met separately for the first meeting, which was held October 16, 2012 at the Horsepasture District Fire Department. The workgroup session immediately followed the first public meeting. Thirteen citizens attended, along with representatives of DCR, its contractor Blue Ridge Environmental Solutions, Inc., DEQ, Patrick and Blue Ridge Soil and Water Conservation Districts, the Department of Health, Henry County, West Piedmont PDC, and the Dan River Basin Association.

Agricultural Working Group Session

- Byron Petrauskas presented to the group the Agricultural Best Management Practices Handout prepared by BRESI, which described the potential agricultural BMPs that could be implemented, costs, number and locations of BMPs needed, and targeted implementation stages for BMP installation.

Livestock Exclusion

- The first goal of implementing practices to reduce agricultural sources of bacteria is to address the direct deposit of bacteria into the stream by fencing livestock from the stream.
 - Practices involving fencing of livestock from the stream include CREP, EQIP, TMDL, and VA state cost-share. Funding options include up to 85% of cost for a 35 foot fenced setback and 50% on a 10 foot fenced setback.
 - In Patrick County, less than 10% of EQIP applications are funded because this program awards money competitively across the state. CREP and state cost share are popular in the North and South Mayo watersheds. Currently, Patrick County also has some targeted TMDL implementation funds for livestock exclusion practices in this watershed. All of the money received in July has been allocated for projects. Stream fencing practices include the installation of watering systems for livestock.
 - Henry County is not currently CREP eligible but may be once this Implementation Plan is complete. According to NRCS, about two-thirds of EQIP applications from Henry County are funded.
- BRESI estimated the amount of fencing necessary by overlaying a graphic showing the stream network in the area with an aerial photograph of the area. If it was difficult to determine if a plot of land was a pasture or a hayfield, BRESI assumed it was pastureland.
- BRESI asked Soil and Water Conservation District employees to verify control measure costs.
 - It was suggested that the IP Ag costs be listed as component costs for IP Ag practices (i.e., fencing cost per foot) as opposed to total cost per practice would make it easier to verify that estimated costs were accurate. Patrick County SWCD suggested that the total practice costs listed in the handout appeared to be a bit low.

- To keep all IPs consistent and facilitate implementation tracking required by EPA, DCR lists practice costs, as opposed to component costs.

Pasture Management and Cropland

- The second goal for implementing practices to reduce agricultural sources of bacteria is to address the overland flow of bacteria into the stream by encouraging pasture management (such as rotational grazing) and management of cropland.
- To reach the EPA goal of zero reductions in the standard, it may be necessary to include retention ponds in some agricultural areas to collect overland flow and allow bacteria to settle out.
- The Department of Forestry commented that the cost of reforestation for the FR-1 seemed high. BRESI suggested this may be the average cost of planting pine and hardwood. DOF said that people in this area rarely use hardwoods, and the cost of pine is only about \$175. Stakeholders agreed that a cost of \$175/acre would be more accurate for the area.
- Patrick SWCD commented that Districts now use a cost of \$300/acre for total vegetative cover

Confined Feeding Operations

- It was confirmed that there are a couple of small feedlots still in the North/South Mayo watershed. No feedlots were identified in Henry County.
- Blue Ridge SWCD said that they have not historically provided state cost-share to move such operations away from streams, but the landowner would be eligible for a tax break.

Manure/Poultry Litter Storage

- Stakeholders agreed that there is no need for manure storage in any of the watersheds.

Agricultural Questions / Comments

Q: Is there an estimate on the number of landowners who would need fencing?

A: BRESI did not calculate the need by homeowner but only by the number of linear feet that would be needed in each watershed.

Q: The LE-2T practice includes a 10 foot setback. Does that width of vegetation really buffer pollutants in overland flow which passes through?

A: The 35 foot buffer is the ideal minimum for achieving filtration. The 10ft. setback is more for exclusion purposes.

Q: Is the state water quality standard for bacteria a realistic achievement in this watershed? It seems like some areas, such as the Blackwater River watershed, exceed that standard with the loading from wildlife, alone.

A: The standard is conservative. The Blackwater River implementation project started slow, but improvements in water quality are occurring. DEQ commented that based on the exceedance rates at the time of TMDL development in the Mayo Rivers, achievement of the standard is very realistic.

Q: Why aren't other local streams, such as the Smith River, included in this plan?

A: The Smith River and several tributaries are included in this plan. All of the tributaries within the watersheds (multi-colored areas on provided maps) are included and eligible areas form BMP installation. Additionally, other rivers and streams within the Dan River Basin were part of the TMDL that addressed the bacteria impairments these rivers. Implementation Plans for those streams will be developed in future years. DCR chose to break the TMDL into several implementation areas to make the implementation process more localized.

Q: Are there any conservation organizations in the area facilitating easements in these watersheds?

A: The Virginia Outdoors Foundation has shown interest in doing so in Patrick County, and the SWCD has agreed to be co-holder of easements in the area. In Virginia, landowners who place perpetual easements on their land may be eligible for Federal tax deductions and state tax credits.

Comment: One resident said that the landowner responsibility to replace fencing installed through CREP, EQIP, or state cost-share programs makes the practice much less appealing, especially as significant flooding is a common occurrence on his land.

Response: Unfortunately, there is not cost-share associated with upkeep of practices during their lifespan (10-20 years depending on the funding source). The state does offer \$1 per linear foot to maintain fence after the state lifespan of 10 years has expired. The WP-2T practice has an incentive payment of 50 cents per linear foot of fence installed, provided to offset fence maintenance costs.

Q: Do fencing practices on agricultural lands allow for livestock grazing or other trimming of the buffer? (The landowner doesn't want the buffer to impair his view of his land.)

A: The buffer should be allowed to grow naturally to maximize its benefits. The plants in the buffer act to filter out pollutants from overland water runoff before it reaches streams. Blue Ridge SWCD said landowners may cut back the vegetation once per year.

Residential/Urban Working Group Session

- Byron Petrauskas presented to the group the Residential Best Management Practices Handout prepared by Blue Ridge Environmental Solutions, Inc. (BRESI), which described the potential Best Management Practices (BMPs) that could be implemented, costs, estimated number of BMPs needed, and targeted implementation stages (a timeline) for BMP installation.

Onsite Wastewater Disposal Systems

- To address residential sources of bacteria, the repair and replacement of failing septic systems and straight pipes will be prioritized.
- Two major types of onsite waste disposal systems are addressed by residential implementation practices: failing septic systems and straight pipes. A failing septic system is one in which damage to the septic tank or distribution box causes sewage to seep out of the system to the ground surface from where it can be washed into waterways with runoff from rain. Straight pipes, prohibited in Virginia, may come directly from a house or from a settling tank and discharge onto land or into waterways. Grey or black water discharges are also prohibited.

- It is challenging to identify homes with straight pipes and failing systems unless the homeowners or neighbors come forward.
 - A Patrick County resident thought the straight pipe estimate may be low, as there are likely significantly more greywater discharges in the area.
 - Roughly 20 years ago, the Henry County PSA pursued efforts to identify straight pipes. County officials felt this would have greatly reduced the number still in existence.
 - Henry County officials said that some septic systems in low-lying areas of the county likely wouldn't be acceptable by today's standards, thereby requiring replacements or alternative systems, rather than repairs.
 - VDH is now seeing the need for repairs on many houses whose last septic permits were issued in the 1960's and '70's. System functionality, depending on upkeep, was estimated at 20-35 years by VDH. It is difficult to estimate likelihood of failure based on house age, as many homes may have been built without plumbing.
- Several stakeholders felt that that education about septic maintenance and financial assistance or septic system repairs and replacements are vital for the success Implementation Plan
 - Septic tank pumpouts are an effective way to identify failing systems and those in need of repair.
 - If state cost-share funds are received through the competitive TMDL Implementation grant application process, residents are eligible for cost shares of at least 50% and up to 75% (depending on income) to help finance residential BMPs, including septic tank pumpouts, septic tank system repairs, septic system installations/replacements, and alternative waste treatment systems.
 - To help spread the word about available cost shares, it was suggested that septic tank haulers be asked to leave flyers about the program with residents who need repair/replacement. VDH mentioned that Patrick County only has two hauling companies. They would likely be interested in distributing information to increase business.
 - DCR mentioned that West Piedmont PDC has gathered partners to develop a proposal for the 2012 TMDL Implementation grant. They are seeking funding for residential (septic) BMPs, citizen monitoring, and vegetated riparian buffer installation in the Patrick County portion of the North and South Mayo River watersheds. If they receive the grant, the funding would begin in July 2013.
 - Since the meeting, Blue Ridge Soil and Water Conservation District has also applied for the 2012 TMDL Implementation grant. They are requesting funds for residential (septic) and Agricultural BMPs in portions of the Smith, as well as the Leatherwood, and Marrowbone watersheds.
 - Any watershed that is not granted funding this year could apply for TMDL Implementation grant funding in the future.
- Stakeholders were asked if the IP should include cost-share for sewer connections.
 - There are no sewer extensions currently planned in Henry County. If extensions occur, homeowners would most likely be required to connect. DCR erroneously stated that in this instance, state cost-share cannot be applied. In fact, state cost-share may pay for these connections; however, the resident would have to have a failing septic system or straight pipe to be eligible. Stakeholders said that a new sewer line is needed in the Blackberry Creek area. The

PSA is working on a GIS sewer layer for Henry County. This may reveal other areas of need and/or those at high risk for failing systems.

- Some Martinsville residents still have onsite systems. The City requires any homeowners with failing systems to connect to available sewer lines.
- In Patrick County, the Patrick Springs sewer line extension is complete, but there are still homes in the area not hooked up to the line. Stakeholders suggested that homeowners opting to not hookup were being charged a monthly fee. Another sewer line is slated for the West End of Stuart (at the intersection of Routes 8 and 58) to service about 6 businesses there.

Pet Waste Education and Disposal

- Pet waste education and disposal programs would be limited to highly concentrate residential areas in the watershed, as well as parks, trails, and confined canine units (i.e., kennels, veterinary clinics, animal shelters, etc.).
- The group discussed the construction of a Confined Canine Unit Waste Treatment System (essentially a septic tank system for kennels, hunt clubs, etc.).
 - Patrick County Stakeholders mentioned two veterinarian offices in the Mayo watersheds that may benefit from an on-site waste disposal system. The number of Confined Canine Units (CCUs) in the watershed was increased from one to two.
 - Henry County stakeholders said that all of the animal shelters and veterinarians within the county were either on public sewer or had a VDH-designed on-site disposal system.
 - No hunt clubs or kennels were identified by stakeholders in either meeting.
- BRESI suggested that the IP include information on pursuing grants to help fund pet waste programs.
- Henry County stakeholders feel strongly that any grant money received would be better spent on addressing residential waste than pet waste issues.

Urban BMPs

- BMPs to address urban (stormwater) runoff include vegetated buffers, bioretention systems (i.e., rain gardens), and infiltration trenches. These practices are intended to slow the flow of runoff, allowing more to percolate through the ground, which provides filtration of some of the particles and impurities in the runoff.
- Dan River Basin Association has experience installing some of these practices. DCR will consult with DRBA representatives to determine if the proposed numbers of these BMPs are feasible.
- BRESI suggested that the IP include information on pursuing grants to help fund urban BMPs.

Residential/Urban Questions and Comments

Q: Do the soils in this area drain well enough to support the drainage necessary for septic systems?

A: Per VDH, less than 1% of people in Patrick County lack adequate soil for septic systems.

Q: If grant money is awarded to address residential septic practices in the watershed, how do you deal with people outside the watershed who may need assistance but are ineligible for the funds?

A: If they are in another portion of the Dan River Basin, which is part of the original TMDL, similar funding may be available once Implementation Plans are complete in those areas. If they are low-moderate income, they may qualify for a grant through Southeast Rural Community Assistance Project (SERCAP). Cy Stober (NC Piedmont Triad Regional Council) mentioned that there are USDA funds available for septic tank maintenance in rural counties, but he is unsure how that is distributed in VA; more information would be available through the local Rural Development office (Rocky Mount). Patrick and Henry Counties are also eligible for Appalachian Regional Commission (ARC) construction funds.

Q: Does BRESI have estimated load reductions in bacteria for each of the practices listed?

A: Repair and replacement of septic systems and straight pipes is assumed to completely eliminate the bacteria from these sources. The amount of bacteria coming from these sources is estimated based on standard daily values for bacteria released per person and average number of people in each house.

Q: Henry County officials asked if they could have a GIS data layer of the watershed to help them target septic outreach to areas of increased pollution and/or older home developments, etc.

A: BRESI will provide a data layer.

Implementation Timeline

The timeline for implementation can range from 10 to 20 years and is typically broken down into two stages. The Stage I goal of implementation would be to meet the VA water quality standard of less than 10.5% of samples violating the standard for concentration of bacteria in streams. The Stage II goal, as required by the USEPA, is to achieve zero violations in the state standard for concentration of bacteria in streams. The goal is to prioritize the implementation actions that will give the greatest reductions in bacterial pollution. It was proposed by BRESI and DCR that the Smith-Mayo Implementation plan be based on a 10 year timeline, allowing 8 years for Stage I implementation and 2 years for Stage II implementation. No stakeholders objected to this timeline.

Steering Committee

The Steering Committee will meet on March 14th and will comprise representatives from all workgroups and relevant agencies representing both residential/urban and agricultural issues. Attendees were asked to consider participating. Please let Heather Vereb Longo know if you would like to sit on the Steering Committee.

What's Next?

- The Steering Committee will meet on March 14th. Members will review reports from all working group meetings to ensure local interests and concerns are reflected in the Implementation Plan. Members will be asked to comment on the draft Implementation Plan's presentation and ease of understanding and will review and comment on the final public meeting presentation.
- A final public meeting will be held on March 28th at the Spencer-Penn Centre (475 Spencer Penn Rd., Spencer, VA 24165). The draft Implementation Plan public document and presentation will have been updated to reflect recommendations by the Steering Committee and will be presented at the meeting.
- Attendees will receive a notice for the final public meeting, which will also be advertised publicly.

For More Information

- Contact Heather Vereb Longo, DCR (540) 394-2586, heather.vereb@dcr.virginia.gov.

APPENDIX B

Governmental Working Group Meeting Notes

Governmental Working Group December 12, 2012 Meeting Summary Spencer-Penn Centre; Spencer, VA

Attendance

Kathy Smith, Blue Ridge Soil and Water Conservation District
Jack O'Connell, Natural Resources Conservation Service-Henry County
Michael Tabor, Blue Ridge Soil and Water Conservation District
P.W. Morgan, Blue Ridge Soil and Water Conservation District
Aaron Burdick, West Piedmont Planning District Commission
Joe Bonanno, West Piedmont Planning District Commission
Tony Collins, Patrick Soil and Water Conservation District
Josh Dodson, Natural Resources Conservation Service-Patrick County
Mary Dail, VA Department Environmental Quality
Debra Parsons Buchanan, Henry County Board of Supervisors
Michael Ward, Henry County PSA
Andy Lash, City of Martinsville
Jeff Turner, VA Department of Health – Patrick County
Darrin Doss, VA Department of Health – Henry County
Dale Wagoner, Henry County
Jack Hodges, Blue Ridge Soil and Water Conservation District
Byron Petrauskas, Blue Ridge Environmental Solutions, Inc.
Heather Vereb Longo, VA Department of Conservation and Recreation

Welcome / Introductions

The meeting began with a welcome and introductions. The discussion then focused on local programs that address agricultural, human, pet, and stormwater sources of bacteria; regulatory controls, and water quality monitoring.

Overview of Local Programs - Agriculture

Natural Resources Conservation Service

Conservation Reserve Enhancement Program (CREP) –This is a buffer establishment program that offers funding for a water source, pipeline to distribute water, water troughs, and stream fencing for livestock operations. FSA is currently taking applications for CREP but there is no money allocated to the program. CREP applications are ranked for funding from a statewide pool; money is not allocated by County or District. CREP pays the farmer 90+% of the average cost of installing a practice, with caps for some practices. Unlike state cost-share, participants may receive partial reimbursement as they complete each conservation practice.

Environmental Quality Incentives Program (EQIP) – This is a flat-rate cost-per-practice component program rather than providing a cost-share percentage of practice. EQIP addresses forestry, animal waste, cropland, and stream fencing concerns. According to Josh Dodson, EQIP is used primarily to help fund cattle exclusion and watering systems. EQIP is sometimes partnered with state cost-share to maximize the benefit to the farmer. In the early 2000's \$750 million in EQIP funds were spent in the North and South Mayo watersheds.

Typically, all state and federal funds received in Patrick County are allocated and disbursed. There is good participation in the Mayo watershed, especially with EQIP-funded practices. According to Jack O'Connell, not many farmers in Henry County participate in federally funded practices. Both NRCS representatives felt participation in federal programs could be improved by more outreach; but they don't have the time to do that. Henry County NRCS could use more assistance in making available options known to farmers; several County representatives offered suggestions and assistance for advertising in the future. Agricultural stakeholders present agreed that the most positive marketing result comes from word of mouth shared among producers.

Patrick and Blue Ridge Soil and Water Conservation Districts

Virginia Agricultural Cost-share Program – The state offers, through SWCDs) financial and technical assistance as incentives to carry out construction or implementation of selected BMPs that reduce nonpoint source pollution and improve or maintain water quality in the state's waterways. Typically, the producer is reimbursed a percentage of the cost of approved practices, though the state recently announced that it will offer 100% cost-share for select practices during the current fiscal year. Stakeholders anticipate this will reduce the number of applications for federal funding of similar practices.

Typically all state cost-share funds received by **Patrick SWCD** are allocated and disbursed. In addition to annual cost share disbursements, Patrick SWCD recently received a pot of money to fund the Livestock Exclusion Initiative project aimed at excluding livestock from streams in TMDL watersheds. There has been significant interest in the program; applications submitted to the program thus far should use all of the money allocated for this project. **Blue Ridge SWCD** also utilizes all of the state cost share funds it receives. This District funds practices in Roanoke, Franklin, and Henry Counties. P.W. Morgan stated that Henry County producers show good participation in state cost-share.

In response to a concern raised at the Agricultural Working Group meeting about the contributions of land deposits of bacterial by livestock, both Districts said that many practices require nutrient management plans, which should reduce such overland bacteria contributions. Byron Petruskus pointed out that the Implementation Plan will require substantial upland pasture reductions and asked if rotational grazing BMPs are suggested and/or implemented when producers pursue fencing practices. Josh Dodson pointed out that NRCS takes all resources concerns into account when preparing a report to suggest practices to a landowner; however, the landowner is not required to implement any or all NRCS-recommended practices.

Representatives from both counties agreed that voluntary BMPs in these watersheds to meet required specifications, so it would not be worthwhile to track them.

Overview of Local Programs - Residential On-site Septic Systems

The **Virginia Department of Health (VDH)** regulates on-site sewage disposal systems. Failing septic systems and straight pipes are a violation of the law and must be remediated if they are reported (see “Regulatory Controls” below).

VDH personnel suggested that fears of high permitting fees deterred residents from approaching them about septic repairs; the permit for installing an on-site system costs \$425, but this is waived for repairs. Often, people can’t afford repair costs. It was suggested that SERCAP might be able to further subsidize such projects. Stakeholders felt strongly that pumpouts help to identify systems in need of repair; it was recommended that grant funding for pumpouts be sought as part of the implementation process. It can be difficult to otherwise identify failing systems, though fishermen often help to locate straight pipes.

The housing boom in **Henry County** peaked 30-40 years ago, indicating many systems may be at risk for failure. Shrinking lot sizes make it difficult to fit adequate drainfields on properties; this problem may also arise during repairs on small lots (especially row houses). Some areas may require alternative waste disposal systems.

Neither **Patrick County** nor **Henry County** requires residents to hook up to sewer lines. If **Henry County** were able to further extend lines, such a policy may be reinstated. The Henry County Capital Improvement Plan includes sewer extensions; however, there is currently no funding for such projects. Henry County has 3 lagoon systems that they would like to take off line and connect houses directly to sewerage. This would cost several million dollars in funds the county does not currently have. There are still on-site disposal systems within **Martinsville** City Limits; residents with onsite systems pay a monthly fee to the city. Residents must connect to the sewer if their system fails. The implementation plan should include “connections to sewer” as a means of remediating failing septic systems. Stakeholders would like to seek funding to help identify areas where sewer connection would be the most beneficial.

Blue Ridge SWCD has experience with residential cost share from the Pigg and Blackwater Rivers Implementation Plans and would be willing to pursue future funding in the Smith and tributaries. **Dan River Basin Association (DRBA)** is well respected in the area. Local stakeholders would consider them an asset in managing implementation grant funds in the area. [Note: As this was a Government working group, no DRBA representatives were present to comment on this.] **West Piedmont PDC** may not be able to support staffing needs for such a project.

Overview of Local Programs - Pet Waste

Residential/Urban Working Group members expressed some concerns that the pet waste management aspect of implementation may turn off residents from wanting to participate in implementation at all. Residents in **Martinsville**, might be receptive to the program.

It was suggested that Jack Dalton and the Smith River Sports Complex, both areas in **Henry County** where people may walk dogs, already have signage about picking up after pets. Stakeholders suggested “Activate Martinsville-Henry County” would be a good place to find additional parks and trails where signage and pet waste stations could be implemented. **Patrick County** also has one park and two trails.

Martinsville-Henry County SPCA could assist with a pet waste education program.

The **Patrick County** Animal Pound has a septic system with fur filter that has been operating about 10 years without any known problems. This may be a good alternative for other kennels, shelters, etc. in the area, though no others were identified by stakeholders.

Overview of Local Programs – Stormwater (Urban Runoff)

The **Henry County** PSA recognized issues with overflows due to improper grease management. A new sewer ordinance is being developed that would require new development to have proper grease treatment technology. Existing problems are traced back to the source, and the PSA works with the property owner to rectify the problem.

The Residential/Urban workgroup mentioned two stormwater BMPs in this area:

- The Patriot Centre Industrial Park in **Martinsville** has retention ponds to control runoff.
- In **Patrick County**, sedimentation ponds collect flow from public sewers in Stuart.
- GWG members were not aware of any other stormwater BMPs in the watershed.

Other Bacteria Sources

No other potential sources of bacteria were identified. A concern was raised about the over fertilization of local golf courses in the watershed, but this would more likely be a source of nutrient than bacterial pollution.

Regulatory Controls

Agricultural Stewardship Act (ASA) – ASA is a complaint-driven bad-actor law administered by Virginia Department of Agriculture and Consumer Sciences (VDACS). VDACS works with farmers and local SWCDs to address reported water quality problems concerning nutrients, sediment and toxins from agricultural activities

Sewage Handling and Disposal Regulations – VDH administers these regulations which result in enforcement actions to eliminate discharges from straight pipes and repair or replace failing septic systems. These regulations define gray water as sewage that should be treated.

There are no pumpout ordinances in the watersheds, though it was pointed out that many mortgage lenders require a pumpout at the time of home sale. The PDC questioned if a pumpout ordinance would be worthwhile, citing backlash in Franklin County where residents must provide paperwork to verify required pumpouts have occurred.

Integration with Other Activities and Planning in Area

Are there existing or planned activities, studies, planning efforts in the watershed

- Eden Watershed Assessment (DRBA)
- DCR – Mayo River State Park study revealed rare mussels in the South Mayo River

- Henry County PSA conducted a source water protection plan study that near the Philpott Dam. A number of agricultural issues were identified through this process.

Funding

- Areas of need in Patrick County, Henry County, and Martinsville are eligible to receive Appalachian Regional Commission (ARC) construction funds.
- Community Development Block Grants have been pursued for Henry County sewer extensions in the past.
- Housing and community development may be able to assist with residential projects; such funding usually requires in-kind match (“sweat equity”).
- Though the Harvest Foundation does fund health initiatives, their focus is mainly on physical activity. Also, they not offer services that replace government functions. They are unlikely partners for residential implementation.
- Tobacco commission funds are available in the area but are generally aimed at promoting economic development. They may not be a good fit for implementation projects.

Monitoring

Mary Dail, VA DEQ, summarized water quality monitoring in the watershed. There are several trend stations in the watershed, including 4ANMR002.60 (Rt. 629), 4ASRE007.90 (Rt. 622 Bridge) , 4ASRE033.19 (Rt 701), 4ASRE043.54 (Rt. 674), 4ASMR075.69 (Rt. 708 bridge), and 4ASMR016.09 (rt. 700 bridge). Trend stations are sampled every year, either monthly or bimonthly. Non-trend, or “rotating,” stations are monitored monthly or bimonthly for a cycle of two years on, four years off. Several stations in the watershed, including those in Leatherwood Creek and Smith River are in the 2013-14 monitoring plan to be monitored according to the “rotating” schedule. Other stations in the watershed won’t be monitored again until BMPs have been in place.

Byron Petrauskas asked if there is a minimum amount of time after BMP implementation before monitoring will take place, as this would be helpful information for the Steering Committee when deciding how and where to spend funds/target efforts. There is no set time; DEQ accepts input from DCR based on implementation progress in the watershed.

A stakeholder asked if Water Quality data were available on the DEQ website. DEQ no longer funds the online water quality database. Such data can be requested through Mary. Jeff Turner suggested that the steering committee regularly compile updates (routine tracking of data) so that people on the ground can follow water quality improvement. After the meeting, Mary Dail reported that Virginia water quality data may soon be transferred to an EPA database called STORET, which would be publicly accessible.

DEQ monitoring can be supplemented by trained citizen monitoring. TMDL Implementation grants through DCR often include funding for such monitoring programs.

Next Steps

Minutes will be sent out in draft to the group and comments requested. This group meets only once. Aaron Burdick of the West Piedmont PDC has volunteered to represent the Government Working Group at an upcoming meeting of the Steering Committee. Other participants will also be invited. The agricultural and residential/urban working groups will meet again on January 29th and 30th.

APPENDIX C

Steering Committee Meeting Summary

Steering Committee March 13, 2013 Meeting Summary

Spencer-Penn Centre; Spencer, VA

Attendance

Kathy B. Smith, Blue Ridge Soil and Water Conservation District
Perry W. Morgan, Blue Ridge Soil and Water Conservation District
Andy Lash, City of Martinsville
Michael Ward, Henry County Public Service Authority
Joseph Bonanno, West Piedmont Planning District Commission
Wayne Kirkpatrick, Patrick County Resident, Dan River Basin Association
Darrin Doss, Virginia Department of Health
Tony Collins, Patrick Soil and Water Conservation District
Darryl Holland, Henry County Resident, Magna Vista High School Ag. Department
Jack M. Hodges, Blue Ridge Soil and Water Conservation District
Brian Williams, Dan River Basin Association
Anna Wallace, Dan River Basin Association
Byron Petrauskas, Blue Ridge Environmental Solutions, Inc.
Heather Vereb, VA Department of Conservation and Recreation

Welcome and Introductions

- Heather Vereb Longo welcomed attendees and reviewed the purpose of the meeting. Each person introduced himself or herself.

Working Group Reports

Governmental Working Group Summary

- Mike Ward reviewed the goals of the Government Working Group and presented the Government Working Group Report.
- It was noted that all cost-share money received by the Patrick and Blue Ridge Soil and Water Conservation Districts has been allocated for the 2012 fiscal year.
- Anna Wallace commented that there are actually 5-7 parks in Patrick County, including DeHart Park and Trail and the Mayo River Rail Trail.
 - Committee members agreed that Patrick County would likely be receptive to pet waste pick-up stations in these areas.

Residential Working Group Summary

- Joe Bonanno reviewed the goals of the Residential Working Group and presented the Residential Working Group Report.
- Wayne Kirkpatrick commented that, in addition to the Patrick Springs sewer extension, Patrick County would soon be extending a sewer line west of Stuart (toward the intersection of Routes 8 and 58). This was mentioned at a Residential/Urban Working Group meeting; however, stakeholders

suggested the line would mainly service about six businesses there. No Steering Committee members knew if this extension would serve any residences.

- Committee Members commented that most hunt clubs in the area were east of the watershed; however, the Boxwood Hunt Club in Axton is in the watershed. It was not known what means of waste disposal is used by the Club.
- Steering Committee Members agreed that one form of pet waste education program residents may be receptive to is the distribution of literature in the packets given to people adopting pets from pounds, SPCA, etc.

Agricultural Working Group Summary

- Heather Vereb Longo reviewed the goals of the Agricultural Working Group and presented the Agricultural Working Group Report
- Darryl Holland commented that, in addition to horses, the number of goats in the area is increasing. Additionally, there are no sheep, very few swine and only one small (less than 15 head) dairy.
- In addition to the BMPs listed in the Report, it was verified the EQUIP funding could be used at two beef feeding operations in the South Mayo watershed.
- Steering Committee members identified a couple of horse stables in the area, including the Tackfully Teamed Riding Academy in Henry, VA and the Patrick Henry Saddle Club in Bassett, VA. The former may only have a few horses. These landowners and others with horses are eligible for cost share on fencing practices, including LE-1T, LE-2T, and SL-6AT.

Potential Plan Funding

- Ideally, the Steering Committee will organize and guide efforts to procure funding for implementation of measures outlined in the Implementation Plan.
- Heather Vereb Longo explained that Soil and Water Conservation Districts receive annual funding from DCR for technical support and cost-share on agricultural BMPs. A completed Implementation Plan in this area may increase opportunities for TMDL funding, increased rates of state cost-share on select practices, and federal CREP funding in Henry County, which was previously ineligible.
- For the past two years, DCR has led a competitive process for funding of TMDL implementation in eligible areas. Stakeholders may submit proposals to fund measures outlined in the Implementation Plan, including agricultural BMPs, septic system improvements and replacements, pet waste education programs, and stormwater BMPs.
- West Piedmont PDC and Blue Ridge Soil and Water Conservation District submitted proposals for the 2012 Implementation Grant.
 - The PDC is requesting funds for residential (septic) cost-share, as well as citizen monitoring and buffer zone improvements through Dan River Basin Association. Their proposal covers the Patrick County portions of the North and South Mayo River Watersheds.
 - Blue Ridge SWCD has requested funding for cost-share on livestock exclusion fencing systems and residential (septic) improvements in the Lower Smith River, Leatherwood Creek, and Marrowbone Creek.

- All applicants submitted a pre-proposal in February and will soon be notified if they have been invited to submit a full proposal.
- Full proposals (for select applicants) will be due back in April or May
- Funding of selected proposals should begin July 1, 2013 and will run for two to two and a half years
- Other recommended funding sources include but aren't limited to those listed in the Implementation Plan.

Review of Presentation Prepared for Public Meeting

- Byron Petrauskas reviewed the draft presentation for the final public meetings, inviting comments from Steering Committee members.
- Committee members suggested emphasizing that implementation is voluntary. Heather will mention this in the welcome/introduction preceding Byron's presentation.
- On slide 3, it was asked that Byron emphasize how bacteria get into the body.
- On slide 5, the Committee discussed how the water quality exceedances in the watershed should be framed. For some perspective, some watersheds have had exceedances in the 80-100% range. Therefore, exceedances in this watershed are relatively less excessive. In short, the water quality goals should be achievable. Additionally, improvements in bacteria concentrations have been observed in areas where implementation is occurring (e.g., Blackwater and Big Otter watersheds)
- On slide 12, the "Inc." should be removed from Dan River Basin Association.
- In relation to slide 16, Darryl Holland raised several comments and questions landowners may pose regarding livestock exclusion fencing:
 - Livestock exclusion on two sides of a stream can be cost-prohibitive, especially for producers with smaller herds.
 - Producers can use in-kind services for their share of the cost-share. This year, DCR offered 100% "cost-share" on select fencing practices. Though all of those funds have been allocated, that offer may occur again.
 - Can the producer water his/her livestock in the stream if a power outage or other problem inhibits well functioning?
 - Producers that they may temporarily water livestock in streams in case of an emergency. Emergency gates in fencing are recommended for this reason. Limited access stream crossings also allow for this.
 - Is ram watering (drawing water from a stream instead of a well) eligible for cost-share?
 - Tony Collins explained that such systems are eligible but are prone to washing out during high-flow events, making wells preferential.
- In response to slides 18-19, Brian Williams suggested the inclusion of "before" and "after" photos highlighting the streambank improvements gained through livestock exclusion.
- Byron commented that on slide 22, the number of public sewer connections will be updated to reflect new data from Henry County.

- Stakeholders discussed the local costs associated with connecting to sewer lines, including the connection and the cost of pipe from the home to the sewer pipe. The number can vary, but Committee members suggest something in the range of \$1500-\$2500.
- Heather Vereb Longo asked if committee members felt the total cost figure on slide 30 would be overwhelming to residents, especially as much of this money is not coming directly out of their pockets. Either way, all costs will be quantified in the Implementation Plan, itself.
 - Kathy Smith suggested that the money will come from residents, directly or indirectly, and that they deserve to see where their money is going.
 - Alternatively, some members suggested showing measurable goals and milestones earlier in the presentation to give residents a sense of what the money would be funding.
 - Members thought slide 32 made the number of practices and associated costs more manageable by showing costs per milestone and year.
 - Heather Vereb Longo suggested illustrating costs versus goals achieved in a line graph format, as has been done in other Implementation Plans.
- The DRBA Patrick County Rivers and Trails Project was stricken from slide 34, as the progress have the project has been halted.
- It was recommended that the Harvest Foundation be added to slide 36 as a potential regional funding source.
- Darryl Holland recommended that when discussing slide 37, emphasis be placed on the voluntary nature of participation in agricultural cost-share.
- Kathy Smith suggested that, based on her experience with residential cost-share, most people do not qualify for more than 50% cost-share (based on income) or do not wish to show proof of income. Therefore, she felt the 75% cost-share rate on slide 38 might be misleading.

What's Next?

- The final public meeting for the Implementation Plan is scheduled for Thursday, March 28, 2013, 6:30-8:30pm at the Spencer Penn Centre, 475 Spencer Penn Rd., Spencer, VA 24165
- Steering Committee members should submit any comments on the draft public report or the public meeting presentation to Heather (contact information below) by Monday, March 25th.
 - Members are asked to review roles/commitments of stakeholders described in the draft public document to determine if they are accurate and reasonable.

For More Information

- Contact Heather Vereb, DCR (540) 394-2586, heather.vereb@dcr.virginia.gov.
- The TMDL studies can be viewed at <http://www.deq.virginia.gov/portals/0/DEQ/Water/TMDL/apptmdls/roankrvr/danec.pdf> and <http://www.deq.virginia.gov/portals/0/DEQ/Water/TMDL/apptmdls/roankrvr/smayo.pdf>

APPENDIX D

Public Meetings Summary

October 16, 2013 Public Meeting Summary

Horsepasture District Volunteer Fire Department; Ridgeway, VA

Meeting Attendees

Bob Gordon, Citizen
Michael Ward, Henry County PSA
Aaron Burdick, West Piedmont Planning District Commission
Joe Bonanno, West Piedmont Planning District Commission
Anna Wallace, Dan River Basin Association
Jack M. Hodges, Blue Ridge Soil and Water Conservation District
Tony Collins, Patrick Soil and Water Conservation District
Virginia H. Mills, Citizen
S.M. Hairston, Citizen
T. Kem Pace, VA Department of Forestry
Craig “Rocky” Rockwell, US Army Corps of Engineers
Jeff Turner, Patrick County Health Department
Bobby Cobler, Landowner
Laura Cobler, Landowner
Darrin Doss, VA Department of Health
Brad Carter, VA Department of Health
Debra Parsons Buchanan, Henry County Board of Supervisors, Horsepasture District
Charles E. Williams, Citizen
Bill Winn, Citizen
Barb Winn, Citizen
Wayne Kirkpatrick, Citizen
Kevin Keith, VA Department of Forestry
Clyde Holland, Landowner
Darryl Holland, Landowner
Ron Morris, WZBB Radio
Rick Meadows, Landowner
T.V. Marshall, Citizen
Marie Marshall, Citizen
Cy Stober, Piedmont Triad Regional Council
Mary Dail, VA Department of Environmental Quality
Stacy Horton, VA Department of Conservation and Recreation
Byron Petrauskas, Blue Ridge Environmental Solutions, Inc.
Heather Vereb, VA Department of Conservation and Recreation

Welcome and Introduction

- Heather Vereb welcomed attendees and thanked them for attending the meeting.

TMDL Implementation Plan Presentation

- Byron Petrauskas delivered a presentation on the TMDL implementation plan process.
 - Portions of the North Mayo River, South Mayo River, Smith River, Blackberry Creek, Leatherwood Creek, and Marrowbone Creek violate the Virginia Water Quality Standard for bacteria. This means they have high levels of fecal bacteria, which can indicate an increased risk for health problems in people who come in contact with the waters.
 - Total Maximum Daily Load (TMDL) studies for these waters were approved in 2004 and 2008; these reports established recommended reductions in bacteria concentrations in the streams to achieve water quality standards.
 - This implementation plan will describe and quantify bacterial pollution control measures, analyze costs and benefits of implementation, and identify financial and technical resources to aid in implementation. The goal of the plan is to prescribe a method by which the reductions of bacterial pollution outlined in the TMDLs can be achieved. Reductions will likely be met through the implementation of the following practices:
 - Livestock exclusion from stream corridor
 - Improved pasture and cropland management
 - Straight pipe removal
 - Repair/replacement of failing septic systems
 - Better management of pet wastes
 - Filtration of stormwater runoff

Public Participation Process

- Heather Vereb discussed the public participation portion of the Smith-Mayo TMDL implementation plan
 - This is the first public meeting and first set of Residential/Urban and Agriculture Working Group meetings
 - A Government Working Group meeting will be held in December
 - A second set of Residential/Urban and Agriculture Working Group meetings will be held in January. There will be one of each meeting held in Patrick and Henry counties.
 - A Steering Committee meeting will be held in February to discuss the draft implementation plan. The draft report will be presented in March and submitted for approval in April, after a 30 day public comment period. It would be ideal for the Steering Committee to remain intact during implementation to guide and adjust implementation actions, as necessary.
 - Attendees are asked to participate in the next Working Group Meetings and to consider participating on the Steering Committee.

Questions and Comments

- Several residents asked for clarification on station locations; Byron shared this information from the TMDL report.

- Question/Comment: The Upper North Mayo station has 33% violation rate of the water quality standard, while the lower station has only a 12% violation rate. He suggested something must be happening between the two to improve water quality.
 - Response: During plan development we will examine possible reasons for elevated exceedance rates in some areas compared to others. This will help to target implementation measures to get the “most bang for the buck” – the most efficient means of bacteria source reduction.
- Question/Comment: Based on map of VA showing bacterial impairments statewide, perhaps the standard is too stringent.
 - Response: Byron Petrauskas agreed that the standard is stringent, but it’s aimed at protecting human and environmental health. Mary Dail (Virginia Department of Environmental Quality - VADEQ) stated that the ultimate goal is to achieve the water quality standard and remove the streams from the “dirty waters list,” but every step we take to reduce bacteria leads to improvement and preservation of our natural resources. There are many areas across the state where reductions have been achieved, even if they haven’t been enough to delist streams.
- Question/Comment: Is implementation mandatory?
 - Response: The Virginia Department of Health (VDH) administers Sewage Handling and Disposal Regulations, which result in enforcement actions to eliminate discharges from straight pipes and repair or replace noncompliant septic systems. The Agricultural Stewardship Act is a complaint-driven bad-actor law which addresses any water quality issues caused by agricultural operations not permitted by the Department of Environmental Quality. All other implementation actions described in the report will be voluntary.
- Question/Comment: How do we identify problems with septic systems? They may go on for years without the homeowner knowing.
 - Response: A major part of implementation is education about proper septic maintenance and/or how to identify problems. Some people choose to ignore problems until they are severe (*i.e.*, sewage backing up into their homes). If a TMDL grant is awarded in this area, funding may include cost-share to help fund septic tank pumpouts. Often, problems are identified this way. With the grant, people then get financial assistance with the pumpout and can receive cost-share also for any repair or replacement needed. Grants are awarded on a competitive basis in areas with implementation plans.
- Question/Comment: Does this plan account for problems with deteriorating infrastructure, such as failing sewer lines?
 - Response: Public sewage infrastructure and facilities are permitted sources of bacteria, which are regulated by VADEQ through a permitting process. Implementation plans focus on nonpoint sources of pollution, which are not “end of pipe” or permitted sources but come from overland flow. Still, we would like this to be a public forum for stakeholders to make known any Public Service or other related issues in the Smith-Mayo watershed. We will put this information in the meeting minutes and in the plan, which may help relevant stakeholders apply for funding later on. Such a process can also help to put residents with issues in touch with the appropriate authorities to help address their problems.
- Question/Comment: Local government representatives should be present for these meetings.

- Response: Several individuals were contacted. One member of the Henry County PSA planned to attend, but an emergency arose. Input and suggestions on individuals to contact would be greatly appreciated – especially as we approach the Government Working Group scheduled for December.

What's Next?

- The Government Working Group will meet in December
- The next Working Group meetings will take place in January. There will be separate meetings in Patrick and Henry Counties.

For More Information

- Heather Vereb, DCR (540) 394-2586, heather.vereb@dcr.virginia.gov.
- The TMDL studies for this implementation plan can be viewed at
<http://www.deq.virginia.gov/portals/0/DEQ/Water/TMDL/apptmdls/roankrvr/smayo.pdf>
<http://www.deq.virginia.gov/portals/0/DEQ/Water/TMDL/apptmdls/roankrvr/danec.pdf>

March 28, 2013 Public Meeting Summary

Spencer-Penn Centre; Spencer, VA

Attendance

Bryce Simmons, VA Department of Health - Office of Drinking Water
Darrell Jackson, Blue Ridge Soil and Water Conservation District Director
Perry W. Morgan, Blue Ridge Soil and Water Conservation District
Kathy Smith, Blue Ridge Soil and Water Conservation District
Joe Bonanno, West Piedmont Planning District Commission
Kevin Keith, VA Department of Forestry
Andy Lash, City of Martinsville
Vickie Collins, Citizen
Jonathan Wood, Citizen
Danny Wood, Citizen
Mr. Smith, Citizen
Darryl Holland, Citizen
Tony Collins, Patrick Soil and Water Conservation District
Jack Hodges, Blue Ridge Soil and Water Conservation District Director
Debra P. Buchanan, Henry County Board of Supervisors
Charles E. Williams, Citizen
Michael Ward, Henry County Public Service Authority
Wayne Kirkpatrick, Dan River Basin Association
Darrin Doss, VA Department of Health
Byron Petrauskas, Blue Ridge Environmental Solutions, Inc.
Heather Vereb Longo, VA Department of Conservation and Recreation

Introduction and General Information

- Handouts available:
 - PowerPoint presentation slide handout
 - Streamside Livestock Exclusion (Zeckoski et. al) publication
 - “Conservation and the Bottom Line” (DCR) pamphlet
 - Landowner Incentive Program (DGIF) pamphlet
- Heather Vereb Longo welcomed attendees, explained the purpose for the meeting and described the process that has been used to develop the draft Implementation Plan to be presented.
- Byron Petrauskas gave a presentation on the Implementation Plan development process and discussed details of the draft Smith-Mayo TMDL Implementation Plan.

Discussion Points

- A citizen asked how bacteria samples were taken.

- Byron Petrauskas explained that, depending on the station type, samples are either taken by the Department of Environmental Quality (DEQ) every month or every other month. A schedule is made and followed, irrespective of weather conditions. Samples are taken at monitoring stations, as shown in the presentation.

Transitioning from Plan Development to Implementation

- Heather Vereb Longo presented on ways that stakeholders could personally help to reduce the bacteria entering local streams, including: septic system maintenance, picking up after pets, learning about and pursuing voluntary agricultural practices mentioned in the plan, and maintaining a “no mow zone” near all streams.
- Heather also discussed funding available and being pursued.
 - Soil and Water Conservation Districts receive annual funding to provide technical assistance and cost-share on select agricultural practices, such as those outlined in the Implementation Plan (IP). Having an IP in place can increase the percentage of cost-share available on selected agricultural practices in these watersheds.
 - For the past two years, DCR has offered grant money, awarded through a competitive proposal process, to fund other types of implementation practices outlined in the Implementation Plan. West Piedmont Planning District Commission, partnering with Dan River Basin Association, Patrick Soil and Water Conservation District, and the VA Department of Health is submitting a proposal for such grant money to use in Patrick County watersheds included in the Smith-Mayo IP. The proposed project would fund cost-share on septic practices (including pumpouts, repairs, and new system installations), as well as some vegetated buffers, pet waste pick-up stations at a local park and recreational trail, and the development of a water quality monitoring program. Any watershed listed in the IP that is not granted funding this year could apply for TMDL Implementation grant funding in the future.
 - The IP contains suggestions for other funding sources that could be pursued. DCR will attempt to notify the Steering Committee of any other relevant funding opportunities that may become available.

What’s Next?

The 30-day public comment period on the information presented at this meeting will end on April 29th, 2013. Questions or information requests should be addressed to Heather Vereb Longo with the Virginia Department of Conservation and Recreation. Written comments and inquiries should include the name, address, and telephone number of the person submitting the comments and should be sent to Heather (see contact information below.)

Contacts

- To comment on the IP, ask questions about the IP and/or the implementation process, or to learn how you can become involved in implementation, contact:

- Heather Vereb Longo, VA Dept. of Conservation and Recreation, 8 Radford St., Suite 102-A Christiansburg, VA 24073; 540-394-2586 heather.vereb@dcr.virginia.gov
- To learn more about funds that provide cost-share on voluntary agricultural practices discussed in the IP, contact either:
 - Tony Collins of Patrick Soil and Water Conservation District, 276-694-3121, ext. 3; tony.collins@va.nacdnet.net
 - P.W. Morgan of Blue Ridge Soil and Water Conservation District (Serving Henry County), 540-483-5269 ext. 115; Perry.Morgan@va.nacdnet.net
- For questions regarding septic systems and straight pipes, contact the Virginia Department of Health:
 - Henry/Martinsville Office, 276-638-3537
 - Patrick County Office, 276-693-2069